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EDITORIAL.

A DISPATCH FROM THE City of Mexico notes the issue of a presidential decree imposing duties on a number of iron and steel products, heretofore admitted free. Thus steel rails will be charged with an import tax of $10, Mexican, per metric ton, and several other classes of finished materials will come under the same duty. Leather belting for machinery has the duty raised from one cent to 50 cents per kilogram. The new duties will take effect March 31 next. The object of these duties, it is stated, is to assist in building up an iron and steel industry in Mexico. In view of our own fiscal policy, we can hardly object to these tariff changes, however inconvenient they may be to some of our manufacturers.

A GOOD MANY THINGS have been said about the effect which the war in the East is likely to have upon the prices of metals. Most of them deserve very little consideration. So far there has been no result from the outbreak of hostilities, except in the comparatively unimportant metal, antimony, the price of which has gone up in anticipation of the stoppage of supplies from Japan. It is quite probable, of course, that the exports of copper from Japan may cease; but their quantity is not large enough to have any material effect upon the market. It is probable also, if the war continues for any length of time, there will be an increase in the demand for copper for the manufacture of cartridges and other war material. Such a result is not yet apparent, however. Tin is not likely to be affected, unless the trouble extends to China generally, in which case there may be a scarcity of Chinese labor, as there was at the time of the Boxer troubles.

THE SETTLEMENT OF prices to be charged for Lake Superior iron ores, during the coming season, is delayed by serious differences of opinion. The price question is not of so much importance as it used to be, since so large a proportion of the output is now controlled by the big steel companies. To them it is a question of the cost of production, not of prices to be paid. It is, however, a serious matter to the outside furnaces, which depend on pur-

chased ore for their supplies. Until the question is settled they cannot well determine the probable cost of producing iron, and they are, consequently, inclined to hold back on contracts. It is said that the independent mine operators want higher prices for ore, though present conditions do not seem to favor such action. The iron-makers are facing a heavy reduction in selling prices, and dearer ore may possibly decide some of them to shut down altogether.

WHILE THE OFFICIAL statistics for the year have not been published, a close approximation, based upon returns from the various districts, shows that the pig-iron production of Great Britain for the year was 8,549,903 long tons. This is an increase of less than 0.4 per cent over the previous year, the production being practically the same. The following table shows the production, the foreign trade and the approximate consumption for two years past in long tons.

	1902.	1903.	Changes.
Production	8,517,693	8,549,903	I. 32,210
Imports	223,138	130,280	D. 92,858
Total supplies	8,740,831	8,680,183	D. 60,648
Exports	1,102,566	1,065,473	D. 37,093
Consumption	7,638,265	7,614,710	D. 23,555

In this table no account is taken of stocks at the opening and closing of each year, but the difference was not very great, so that the figures for consumption may be taken as close approximations. For some reason or other, which is not altogether clear, the iron makers of the important Cleveland district for several years past declined to furnish full statistics of the output of their furnaces. It is, therefore, the Cleveland production which has to be estimated in making up the year's production. The figures show very little change in the iron trade in the past year. They also show that Great Britain has now fallen nearly two million tons behind the German production.

THE HYDRAULIC MINERS of California are much interested in the so-called Gillette bill now pending. The new law simply proposes to make violations of the Caminetti act, where hydraulic miners are operating under a permit from the Debris Commission, answerable before the Federal Courts. The Anti-debris Association is opposing this plan, because it believes that there is a better chance of convicting hydraulic miners of transgression of the law in the local courts. The Anti-debris Association, which at one time had a membership in a large number of California counties, is now practically restricted to two—Sutter and Sacramento. Yuba county, which at one time was largely interested in the Association, no longer gives it any support; in fact, the mining interests of Yuba are now large, including a number of dredging propositions. There is no reason to believe that full justice would not be done, in any case of violation of the law, by the Federal Courts, and it seems reasonable that offences against the Caminetti act should be triable in those courts, inasmuch as the law is one passed by Congress, and mine permits under it are granted by a Federal commission. In this respect the wishes of the miners seem to be only reasonable. Persons operating, or attempting to operate, hydraulic mines without permit from the Debris Commission may still be brought before local courts. In the Federal Courts, however, miners may be sure of freedom from local prejudice, and, consequently, a fair verdict.

SPELTER PRODUCTION OF THE WORLD.

Messrs. Henry R. Merton & Company, of London, have, for a number of years past, published estimates of the production of spelter in different countries. Long experience and a system of correspondence with the producers has enabled them to approximate the official figures very closely. Their statement for 1903 has now been issued, and we give below the figures for the European countries. For the United States, however, we have used our own figures, as published in the JOURNAL for January 7, which differs slightly from the Merton estimate. The figures given are in long tons of 2,240 lb.

	1902.	1903.	Changes.
Begium, the Rhine and Holland.	200,140	215,690	I. 15,550
Silesia	115,280	116,835	I. 1,555
Great Britain	39,610	43,415	I. 3,805
France and Spain	27,030	27,920	I. 890
Austria and Italy	8,460	9,025	I. 565
Poland	8,150	9,745	I. 1,595
Total Europe	398,670	422,630	I. 23,960
United States	141,273	139,570	D. 1,703
Total	539,943	562,200	I. 22,257

It will be seen that in all the European countries there was some increase in the output of the metal. This was in part due to a good demand abroad, and to the fact that the market was not affected by American spelter, exports from the United States having been practically nothing for the year, although some ore was sent abroad, chiefly to the Vieille Montagne Company's works in Belgium. The Belgium producers, it may be noted, turn out the greater quantity of the metal made by them from imported ores, buying them in Spain, Italy, Sardinia and other countries, wherever the operation can be conducted at a profit. The British makers, who showed a considerable gain last year, also use imported ores largely. The other European countries exhibited small gains, and it is somewhat remarkable that the Silesian smelters should have made such a trifling increase as the table shows.

Taking the world's production altogether, we find that the increase was not a large one, amounting to only about 4 per cent over the output of 1902. It was just enough, in fact, to show that the production is not stationary.

PROGRESS IN SOUTH AFRICA.

Affairs in South Africa appear to be shaping themselves in a manner favorable to the advancement of that great mining region. In Cape Colony the majority secured by the Progressive party in the recent elections for the House of Assembly indicates that the power of the Afrikander Bond is broken and that the intrigues of that insidious group of politicians will no longer hold back the best of the Dutch people from joining with the English in furthering the real interests of the country. The Boers of the Transvaal were good foes and are now loyal co-workers with those who fought them successfully, but so long as the Dutch politicians of the Cape—who did not fight—remained in control, the future of South Africa was menaced. Dr. Jamieson is leader of the Progressive party and we hope he may live long enough to atone for the folly of the raid; that raid and its consequences have caused many to forget the high reputation he had previously won as administrator and man of affairs. To some men opportunity comes only once, to him it has come again; we trust he will be enabled—as his great leader, Cecil Rhodes, was not—to redeem a folly and be a strong man in an era of reconstruction.

Meanwhile in the Transvaal itself, the Legislative Council has voted favorably on the question of admitting Chinese coolies, and during the past week the Imperial legislature at Westminster has sanctioned that departure from British precedent, so that there is the probability of a speedy amelioration in the labor situation at the mines. It is an experiment which only extraordinary circumstances would appear to justify, but there seems indeed to be no other remedy, and it is one which has been well considered before its adoption. Should the war in the East not interfere with the arrangements for securing Chinese—and it need not, for they will come chiefly from the southern provinces of China—then a revival in activity may be expected at Johannesburg. We trust that the financial houses will content themselves with putting existing mines on a proper basis of operations and not attempt, for some time to come, to enlarge the area of mining work by the flotation of new schemes for the digestion of which the mining market is obviously in no mood. If good sense and not greed is allowed to guide those in control there is reason to expect a notable improvement in the mining industry of South Africa, and though we ourselves view the matter from the outside, our good wishes are with our friends at Johannesburg and anywhere else where legitimate mining plays the part of a beneficent industry.

A BUREAU OF MINING.

On another page our valued correspondent who writes above the signature of 'Investor' has some plain things to say about paternalism as applied to the regulating of the mining industry. It is fair to say that the particular suggestions which he animadverts were offered before the present discussion on a Bureau of Mining was started and referred more particularly to another scheme fostered of late by the American Mining Congress, an organization much less representative than its title would indicate. This scheme involved a Department of Mines with a Secretary who is a member of the Cabinet, after the manner of the Department of Agriculture. To any such proposal we are opposed, because it means a mere multiplication of bureaucracy and an amplification of the political machinery, which already tends to complicate needlessly the free play of national activity. There exists an organization and a corps of men quite able and amply sufficient to do all that is necessary; we refer to the Geological Survey. It is the reorganization of this distinguished corps that we advocate; with a greater scope for economic geology—the foundation on which the Survey was built—and assurance of freedom from the encroachments of the wood and water departments.

At the present time there are employed under the United States Geological Survey about 40 geologists, 120 topographers and 230 hydrographers. The growth of the Survey as a miscellaneous bureau has obscured the purpose for which it was created, until economic geology plays a very minor part, as measured in numbers, appropriations, office room and other facilities.

Even the free distribution of its publications is due to a desire to suit the irrigation propaganda and meet political necessities. This gratuitous distribution leads to the dispersal of bulletins among congressmen and exchanges, so that they are obtained only with difficulty by the very people for whom they are intended; thus the recent report of Tonopah was exhausted within 24 hours of its issuance. If the publications of the Survey were sold at a low cost, congressmen would not waste them nor would a large proportion of them find their way so quickly to a certain second-hand bookstore at Washington. Nothing for nothing is sound business. Valuable scientific papers of great practical value ought not to be scattered with the liberality of a street fakir, but arrangements should be made with reputable booksellers to dispose of them, and other agencies, such as the State mining bureaus, might well be utilized for this purpose.

The plain truth of the matter is, that the advocates of irrigation, forestry and like public works have an influential political support, while economic geology is appreciated most by those who have least to do with politics or politicians. It ought not to be so—that we grant freely—but it is a fact that the average mining engineer dislikes to be under any obligation to his congressman; to urge the latter to support any particular legislation which will lead to greater efficiency in the Survey necessitates some sort of counter-obligation. The majority of mining engineers do not know their own congressional delegation, but to secure any improvement in the present condition of the Survey there is only one practical step to take, and that is to enlist the interest of the Senators and Representatives. Therefore, for this reason and on the larger grounds of good citizenship, we advise our professional friends to get busy and make the acquaintance of those who represent or misrepresent them, as the case may be, at Washington.

MARKET CONDITIONS.

FEBRUARY 24.

The metal markets have generally been very quiet, with only a moderate amount of business transacted. Political conditions abroad are interfering with business there, while the unfavorable state of the stock markets and the excessively long winter continue to make matters somewhat quiet on this side. No changes are to be reported, except that spelter is somewhat firmer.

The report of the Tennessee Copper Company for 1903, submitted at the annual meeting to-day, shows that the gross profits were $500,420, of which $415,537 were from sales of copper and the balance miscellaneous. Interest and depreciation absorbed $82,855, leaving a net profit of $417,565, which, with the balance of profit from previous year, gave a total of $716,900; from this two dividends, amounting to $437,500, were paid, and $61,786 paid on construction. The smelters treated 284,202 tons of ore, producing 10,690,389 lb. fine copper, or 37.615 lb. per ton of ore. Ore reserves now amount to 2,775,000 tons, an increase of 725,000 tons during the year, in addition to 290,000 tons mined. The average selling price of copper was 12.98c. The total cost of copper at the works was 8.20c. and eastern expenses 0.96c., making in all 9.16c per pound, without taking credit for miscellaneous receipts. The showing made is excellent, and the directors have decided to double the smelting plant, making six furnaces in all.

Silver continues strong under the influence of the war, and very heavy buying, supposed to be for use in China.

The iron market remains in rather a confused condition. Pig iron continues to sell, but at reductions in price, and long orders are scarce. In finished material business in bars and one or two other items has been fair, but that in structural material and plates is quite disappointing. Some orders for steel rails are being placed.

The western coal trade is in rather poor shape, owing to transportation troubles.

The Atlantic seaboard bituminous trade continues quiet, with no particular change in conditions anywhere. Sufficient coal is now arriving to supply all immediate needs.

The anthracite trade has felt the cold and stormy weather, and wholesale buying has improved, while retail trade falls off with a rise in temperature.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Concrete may be made impervious to water by the application of linseed oil which is absorbed by the concrete, filling the pores and forming a gum on the surface.

The Mt. Bischoff tin mine at Waratah, in Tasmania, declared a dividend of 7½s. in December last, the total up to date being £1,912,500, or about $9,562,000. This is the most profitable tin mine in the world.

New Zealand last year started to open a State coal mine, the object being to regulate coal prices and prevent exorbitant charges. The mine is now open, and has begun to produce, the output being 60 tons a day. The Government will, therefore, soon be a competitor in the coal market.

The Keep-it-dark Gold Mining Company, in New Zealand, is a prosperous company, having just declared dividend No. 144. The name might fit several companies in this country, some of which do, while more do not, pay dividends.

The Wigan Coal & Iron Company, in England, is successfully operating a plant for making paving-blocks and street flagging from slag. The slag passes through a crusher, the coarse being separated and used for railroad ballast; the fine is further crushed by rolls, mixed dry with cement, then mixed again with water and passed into a hydraulic press, which produces a hard, dense block of uniform character. The blocks are then stacked, left to dry and harden. The paving-blocks are said to stand well under wear of the hardest kind. The Wigan plant has been so successful that it is to be enlarged.

Russia carries the banner as the largest producer in the world of manganese ore and petroleum. The output of manganese ore in 1900 was 802,234 tons, but it has since fallen off considerably, owing to the decreased demand for export. The largest output of petroleum in any one year was in 1901, when it amounted to 80,553,152 barrels.

Japan's mineral wealth is chiefly in salt, coal, copper and the precious metals. The official returns for 1901 show the following totals of production by Japanese mines: Coal, 8,945,939 metric tons; copper, 27,439 tons; sulphur, 16,577 tons; gold, 2,480 kilograms; silver, 54,839 kilograms.

In the Otago mining division of New Zealand, the dredging companies in operation last year paid dividends amounting to £107,506, on an aggregate capital of £442,111; those in the Southland division paid £17,838, on £104,272 capital; while on the West Coast, with an aggregate capital of £338,128, the dividends only amounted to £16,752. In the West Coast district much difficulty was encountered, because the dredges used were too light, and because heavy timber and other obstructions were encountered. In Otago there were 62 dredges in operation last year.

THE AMERICAN MINING ENGINEER.*

By A. R. LEDOUX.

Our mining engineer is not simply a product of the American system of education; he is born of the necessity for original work and invention due to the demands of a new country unhampered by traditions. One of the great disadvantages of our brothers in older countries lies not simply in the fact that their courses of study are usually along well-established, and therefore inflexible, lines, but that they are in contact with men who object to change in practice. Our American technical institutions are comparatively young; therefore they are ready to adopt anything that seems to be an improvement upon established methods. Their professors, too, are more easily in touch with the men in the field, and the students of their summer schools of mining can see the very latest methods in practice by journeying to the fields where active work is being prosecuted. It is doubtful whether the earnest student of the Royal School of Mines is able to find in Cornwall or in Wales even to-day, as we do here, the practice of methods of mining or smelting too recent in their adoption to be described as yet in the text-books.

I remember accompanying my friend, Mr. James Douglas, on a trip to South Wales. After unwinding considerable red tape we were reluctantly admitted to view a particular piece of mechanism invented by the superintendent of a certain smelting works. This superintendent was progressive and had experience of the American free trade in ideas. With difficulty he persuaded the managing director to allow us to visit other parts of the establishment. In one corner we found an experiment in bessemerizing low-grade copper matte. The assistant in charge informed us that the furnace continually froze up; the reason was apparent—the blast was limited to a few ounces of pressure. Mr. Douglas suggested that they try as many pounds of air as they were then using ounces. The smelter, with many misgivings, agreed to make the experiment, saying at least they could be no worse off. On our reaching London some hours later, we found a telegram from the manager of the works stating that the bessemerizing was now successful and that he could not thank us enough for the hint. This will serve as an illustration of the advantage derived from the interchange of ideas, making the experience of practical men everywhere leaves in an open text-book, where each may study and profit by the successes and mistakes not only of his predecessors but of his contemporaries. I think it is characteristic of the American mining engineer and metallurgist that we recognize the advantages of co-operation and interchange of ideas, realizing how much each may learn from the other. We are, as a rule, generous in the exchange of information. American mines and smelting works have been far more accessible than those of Europe, although every manager has some invention of his own which he might be tempted to retain for his own private advantage. It is this spirit of co-operation and comradeship which Mr. Andrew Carnegie has recognized and which he wishes to symbolize by his gift of a magnificent building for the tenancy of the four most prominent engineering societies of our country. In speaking of this desire, and contrasting what he conceived to be the professional spirit of American engineers with those of Great Britain, he said, "American engineers are—like our States—united; the average English professional man is a professional island."

It seems to me proper in this connection to warn some of our largest, strongest and most recent aggregations of capital against the tendency which is beginning to show itself to restrict their employees in this interchange of professional courtesy and information. In the long run no establishment loses anything; on the contrary, it gains by applying the 'open shop' to methods and general information.

I remember accompanying an engineer, now present in this room, but whose modesty compels me to omit his name, upon an examination of a prospect in our southwestern country. Elaborate instructions had been cabled to us and we had been informed that it would probably take us two weeks on the property to complete the investigation. Upon our arrival we found that the development was such that we could 'size it up' as well in two days as in two weeks, so after taking our samples and deciding even in advance of the assays that the prospect was not worth the price demanded, we started back. A heavy fall of snow had intervened, and halfway to the railroad, traveling on snow-shoes, we met a team floundering in snow drifts, and a vigorous Englishman in yellow leggings assisting in digging them out. He expressed great surprise at meeting us, stating that on his way back to England from another examination he had been cabled to join us and watch our method of examination, so as to advise our English clients whether we were sampling according to well recognized rules. Standing up to his waist in snow he catechised us frankly as to our method of examination, occasionally shaking his head in dissent, and at last said, "Well, I must go on anyhow, for you have neglected to take any specimens of the rock for petrographic slides." It may be said in passing that, in spite of our neglect to prepare thin sections, our opinion of the property has been since justified through the failure of several syndicates and the breaking of at least one bank.

The late Hamilton Smith, of London, by birth and training a typical American mining engineer, but understanding and employing experts of all countries in all lands, upon being asked what was the most characteristic difference which he found between the American and the European engineer, replied, "Well, in South Africa the American never lets up. He works from daylight until dark and is thinking about his job in the evening. Our European engineers want to stop at four; the Englishmen to play tennis, the Germans for their beer."

The English head of a progressive and important mine, one of the most important in the production of a certain metal, who had previously had charge of important enterprises in America, once said to me, "I am inclined to believe that the fact that a man does anything by the method which his grandfather employed is of itself proof positive that the man is inefficient, and his work unsatisfactory."

From this brief consideration I think you will agree with me that I was correct in my statement to the British educational commission, that the advantages of the American mining engineer are due not exclusively to his initial education, but to the necessity for initiative born of his environment; to the mechanical instincts of the race, and to the natural buoyancy and self-reliance of our people.

*Portion of Presidential Address delivered by Dr. A. R. Ledoux before the American Institute of Mining Engineers at Atlantic City, February 16, 1904.

AMERICAN INSTITUTE OF MINING ENGINEERS.

The recent meeting began, according to programme, at Atlantic City, on Tuesday evening, February 16. Dr. Albert R. Ledoux occupied the chair, and read an interesting presidential address, a portion of which we publish elsewhere. The first paper was that of Mr. Harrison Souder on 'Mineral Deposits of Santiago de Cuba.' The author, being present, replied to questions concerning the mineral resources of Cuba. Next, Dr. R. W. Raymond gave a biographical notice of Prof. Robt. H. Thurston.

On Wednesday morning, the session began with Mr. Richard Moldenke's paper on the 'Physics of Cast Iron.' Mr. Edgar S. Cook had a paper on 'Chemical Specifications for Cast Iron,' and this, together with the previous paper by Mr. Moldenke, became the basis for a lively discussion in which many members took a share; among them were Messrs. Gayley, Outerbridge, McKenna, Fackenthal, Wood, Roe and Bachmann.

At the afternoon session Mr. Walter Wood presented a paper on 'Specifications for Iron Pipe,' and a discussion ensued in which Messrs. Raymond, Souther and McKenna took part. Then Mr. A. E. Outerbridge brought forward a paper on 'The Mobility of Molecules of Cast Iron,' describing the permanent growth of bars, under repeated heating, up to 46 per cent of the original volume. This paper was listened to with great interest and elicited questions from Messrs. Lane, Gillette and Raymond. The secretary read a paper by Dr. Persifor Fraser on 'Orogenesis, and Some of its Bearings on Economic Geology,' and another by Mr. Geo. F. Kunz on 'Radio-Active Minerals.'

On Thursday morning, the report of the Council was presented; this showed a satisfactory condition. The total membership is now 3,507, 415 new members having been added during the past year. The deaths—59 in number—were just equal to the totals of the two previous years. A further report on the library stated that the Institute now has 15,000 books, 1,668 volumes having been added during the year. The president made a statement regarding the Carnegie gift and the steps to be taken in order to carry out that project. Then the scrutineers reported the result of the annual election: Mr. James Gayley, of New York, being elected president; Messrs. Julian Kennedy, C. D. Walcott and Geo. W. Maynard, vice-presidents; and Messrs. F. L. Grammer, C. H. Snow and Joseph Hartshorne, managers.

Then followed a paper by Mr. W. A. Barrows, Jr., on 'The Use of High Percentage of Mesabi Ores in the Blast Furnace,' and a description by Mr. Frank M. Zeller of a graphite separator, the last being particularly interesting as affording a possible method of cleansing pulp made from printed paper. Altogether, 49 papers were presented at this meeting.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

THE VIRGINIUS MINE.

The Editor:

Sir.—Having just had occasion to read the articles of Mr. H. W. Reed in the number for August 22, and Mr. C. W. Purington, in that of September 26, 1903, with regard to the geology of this interesting mine, it occurs to me that some notes which I find in my old note-books, made in August, 1888, may be of value as affording a record of the veins as they were exposed in the earlier workings which are no longer accessible.

At that time the mine was under the management of Mr. H. W. Reed. It was opened by an adit on the third level, through which a vertical shaft was sunk to the 8th level. The notes apply, therefore, to the part of the mine included between these levels.

The strike of the vein is N. 36° W. Its general course is on a horizontal plane, being remarkably regular, though, as shown by the tracings of the drifts that followed it, it is not a perfect plane but a waving surface, which is generally the case with fault fissures. It stands practically vertical, the shaft being in it at the 800 ft. level, though above the fourth level its dip is slightly to the east, and below the fifth slightly to the west of the vertical.

The vein was formed by a faulting of the country rock, whose movement was generally disturbed on two more or less parallel planes at varying distances from each other. The ore, however, occurs in a single, narrow streak on one of the planes, the other carrying only a clay gouge, while the intermediate space is occupied by compressed but somewhat shattered country rock, which may carry a few quartz stringers, but is practically barren of pay ore. The adjoining country rock is unusually hard and altered on every side of the fault fissure, what little alteration is observed consisting of a slight bleaching or decomposition extending a few inches from the pay-streak.

The ore consists of gray copper, generally amorphous, and fine-grained galena, the only gangue mineral being quartz, which is in relatively small amount and not always present. It is very rich, running from 300 to 500 oz. silver per ton, in car-load lots.

Fig. 1 is a diagramatic representation of the typical vein structure, as described above. The actual ore streak is rarely over a few inches in width. When over 3 in. in width it shows true comb structure—that is, it consists of bands of metallic mineral on either wall with quartz more or less filling the medial spaces; flat vugs lined with quartz crystals are not uncommon. It occurs sometimes on one, sometimes on the other wall of the faulted zone. Where these two walls approach closely it is sometimes found on both. In such cases it often appears as if the two wall fissures crossed each other. In some places only a single knife-edge seam of ore or quartz is visible. This is said to be the case in the upper workings above, into the north of a barren zone 100 to 200 ft. wide, which crosses the shaft with a steep northern dip between the fifth and eight levels. Outside of this barren zone the ore is rather evenly distributed in the vein—that is, it is never wanting for any great distance, though it sometimes jumps from one fissure to the other, and is only found again by cross-cutting. There is some evidence of sheeting in the country rock given by more or less parallel fracture planes disclosed by cross-cuts, but this feature is less pronounced than in many other parts of the region. The distance between the two fracture planes is variable, being sometimes 30 feet or more.

Vertical cross-fissures occur which traverse the vein nearly at right angles. One which cuts the barren zone and was said to throw the vein about 20 ft. was not seen by me, but the evidence of throw given did not seem conclusive. That which was seen on the fifth and sixth level was an actual seam carrying gouge matter and some ore which crosses the vein at right angles. It does not throw it,

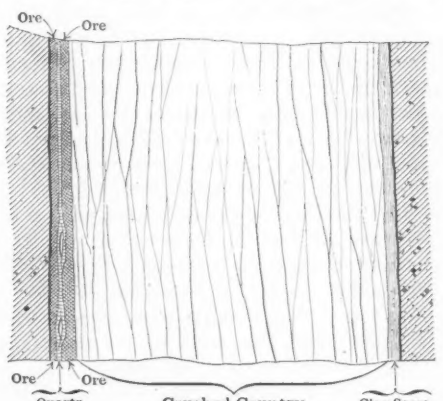


FIG. 1.

however, and would appear to be contemporaneous or at least formed prior to ore-deposition, since the ore was deposited on it for some distance from the main vein. Horizontal cross fissures were also observed, marked by a moist clayey gouge, which throw the vein a few inches, and are probably of recent origin.

As regards the point of difference between Mr. Reed and Mr. Purington, my evidence tends to confirm the latter's opinion that the ore is rather a filling of actual open cracks than of replacement, though it is very possible that in some parts it is a replacement. As to whether the upper part of the vein is an andesite dike, as Mr. Reed maintains, I have no data, but as examined by me it hardly seems to come under the strict definition of 'linked' vein.

S. F. EMMONS.

Washington, Jan. 11, 1904.

MAGMATIC SEGREGATION OF ORES.

The Editor:

Sir.—It is well known that there are two perfectly distinct types of primary copper sulphide bodies formed at or near the contacts of basic igneous with older rocks; these are generally recognized to be formed, respectively, by segregation and by emanation. The former are characterized by a preponderance of pyrrhotite and the latter by pyrite, epidote, calcite, garnet, etc., the pyrrhotite being relatively inconspicuous; the former are evidently fractional crystallizations from a wholly molten magma and occur within the boundaries of the intruded rock, while the latter are replacements, impregnations, and cavity fillings formed by gaseous liquids, under high pressure and temperature, which have been ejected from the almost solidified magma.

To those who concur with these views I would like to submit the following theory for consideration: *That the pyrrhotite segregations are deposited from a magma which contains little or no gaseous-liquid matter.* I have noticed that in a number of the pyrrhotite segregations of Alaska the parent igneous rock contains *augite* in the main or unaltered portions, whereas the emanation deposits are associated with rocks containing no augite. As augite and hornblende are allotropic modifications of the same chemical compound, and there is no chemical distinction between augitic and hornblendic rocks, it seems obvious that the allotropic modifications are governed by substances which have subsequently left the magma, such as water, etc. As hornblende is so often a product of aqueous alteration in solidified rocks one has always to be on the alert for this form of metamorphism when examining rocks in the field or with the microscope.

It would be interesting to hear what Mr. Robert Stevenson has to say on the influence of water on magmatic segregation, but I dissent from his view that discussion should be confined to any particular case. Mineral deposits all differ from one another in some respect, and can never be exactly classified. It is only by taking a general or perspective view of a large number of partially similar cases that any broad general laws can be deduced, for example, in the case of pyrrhotite segregations mentioned above it is not unlikely that cases occur where the magma is not wet enough to hold all the sulphides in solution during the cooling process, so that some of them are crystallized with the silicates and bring about the 'mineralized country rock,' so common in south-eastern Alaska.

Many minor phenomena may be explained by fluid-pressure differences. Liquid slags and lavas at ordinary pressures can only hold a small quantity of steam in solution, but with an increased pressure they can absorb more; just as carbonic acid gas is more soluble in water when pressure is applied. When an intrusion approaches the surface the fluid pressure falls and the steam separates in bubbles, which unite by their surface tension when they collide, and finally grow big enough to reach the top of the magma, in spite of convection currents; or they are retained by the viscosity or plasticity of the magma, from which they may or may not finally escape. The first case is illustrated by gaseous explosions and emanations observed at or near volcanoes and forming native sulphur deposits, and the second by the amygdaloidal and vesicular structure and liquid inclusions in viscous but less rapidly cooled rocks.

When a dry intrusion occurs in a porous country whose interstitial water-pressure is sufficiently great, the laws of osmotic pressure will evidently apply. If there are convection currents, the water, on passing the contact, will be distributed through the whole mass; if the magma is too viscous or plastic for these currents, only a border next the contact is usually altered to a hornblendic rock, the hornblende graduating into one of the pyroxenes; this is evidently owing to the slowness of diffusion.

It is also evident that when the magmatic pressure is sufficiently high to keep the aque-

ous portion in solution cases will occur where the osmotic flow is from the magma to the wall-rock; the diffusion would also be very slow in this case and the effects would be obscured by those of the later emanations from the porous solidified magma.

BLAMEY STEVENS.

Valdez, Alaska, Jan. 15, 1904.

VEIN FORMATION AND THE NEW GEOLOGY.

The Editor:

Sir.—If the new geology is to be accepted, is not the whole subject of vein formation to be rewritten from an altogether new standpoint? If there was originally no fire-formed crust, hence no real igneous rocks, and if bituminous substances were not originally organic, and carbon dioxide springs do not call for a huge burning lime-kiln or other similar source beneath the surface; in fact, if nothing is as we were taught, had we not better set about the work of revision at once?

In the place of meteoric water forcing itself downward against the same sources that bring it back, dissolving out and collecting particles of metals on its way down to deposit in mass on its way up, we now have water as an original constituent of the earth's interior, squeezed out or vaporized, seeking the surface by lines of least resistance, bringing with it a load of mineral substances. We do not now have to invent fantastic schemes to get the water down—it belonged there from the beginning; not simply in the 'zone of fracture' of Van Hise, or the 'lithosphere' of Powell, but deeper than plummet ever sounded, perhaps in the very center of the earth. The earth's surface was always cold, but, as it grew in size, gravitative stress produced pressure and heat, forcing out the contained water, forming oceans, and, incidentally, in later days, metalliferous veins. As Posepny has pointed out, all miners are 'ascensionists.' No one ever met a miner who did not think that minerals came from below, and that the veins reach downward forever. The new geology, it would seem, is upon his side absolutely, so far as the remote origin of metalliferous veins is concerned.

The phenomena so largely studied by Emmons, Van Hise and hosts of others are mainly surface phenomena only, and have to do with secondary enrichments, alteration and rearrangement of the vein contents, because all are based upon the action of meteoric water; but the unaltered parts of fissure veins, and the remote origin of metalliferous substances of both veins and beds, have their genesis at depths heretofore unguessed, and are entirely independent of meteoric water. So long as we were hampered with the view of a fire-formed crust, we were obliged to get the water down into the dry earth before we could get it back, and perhaps many of us felt the utter inefficiency of meteoric water to do the work claimed for it—hence our interest in the 'new geology.' No especial claim to originality is made, as its application to vein formation would occur to any one.

To repeat, the point to consider, if the new geology is true, is that the work of collecting metalliferous substances, now forming ore-beds and veins, was not done by descending and ascending surface waters, but by ascending waters from the earth's interior, which waters were a part of its original composition and which were squeezed out, or vaporized, from great depths, carrying with them the metalliferous substances of ore-beds and veins. These they deposited whenever the proper conditions were encountered, either by cooling, by reduced pressure, or by meeting the proper reagents, either organic or inorganic, and formed, under proper conditions, either veins or ore-beds. There often may have been a reaction between the ascending earth waters and descending meteoric waters. Any one can imagine proper conditions for himself. The great importance of faults and fissures is shown by the fact that they provided the passages through which the earth waters came.

The idea of a cooling globe condensed from fire-mist was a poetical one, and most beautiful pictures have Winchell and others given us of the Titan conflict between the white-hot globe and suspended oceans,—how they condensed and came down in torrents, only to be dissipated and hurled back with ten thousand deafening explosions, returning again and again to the conflict. It was a beautiful picture, a magnificent show,—but great waste of horse-power! In time the waters conquered, and the hot, seething, alkaline ocean dissolved out certain constituents of the fire-formed crust—the real 'Archæan,' or beginning rocks, out of which T. Sterry Hunt precipitated the first rocks that were not fire-formed.

All this wild speculation came, we are told, because we built our geological foundations upon the dreams of Swedenborg and Kant, instead of the hard bed-rock facts beneath our feet. It is true that La Place 'demonstrated' mathematically the truth of the nebular hypothesis, but now it is all gone! There was never any hot earth; there is no approaching final winter; there were no suspended oceans, and they are not drying up—they are getting bigger and the earth getting hotter. In fact, it seems that every thing was wrong, and the divine 'dreamer' who wrote Genesis, dreamed as good a geological dream as any of them; better, because, while he separated the waters above from those below, he did not go into details, and the miner who delights to misquote Job by saying there is a vein for silver, and a place for gold "where you find it," would seem to be the peer of Emmons and Van Hise.

The old geology gave us such a clear and satisfying explanations of everything that it is hard to part with it! It seemed good to talk about a 'lithosphere,' which is here applied to the "outer sphere, known to be solid," and "the term centrosphere applied to the central mass within the lithosphere," of which we didn't know anything, save that it was drier than a prohibition town in Kansas. We did know, however, at least so we all thought, that ore-deposits were derived from the 'zone of fracture,' and not from the centrosphere, for, "If any one asserts," says Van Hise, "that the metalliferous materials of mineral veins are derived by water circulation from the centrosphere, or are derived from the lithosphere below the zone of rock fracture, I hold this to be a pure unverified assumption."

We were, of course, forced to this view because, unlike the miner, we had to get the water down before we could get it up, and now we have to get it up before it can go down! At last, however, geology is made, so Professor Fairchild tells us, by geologists, and the philosophers are discredited. He indeed permits the geologist to have his "head in the clouds," but insists that he must keep his feet upon the earth.

It may not be out of place to note that a former brilliant United States senator once, with seeming justice, ridiculed the Geological Survey because it did not confine itself to the earth, but went wandering off to the moon. But was it not, after all, this far away journey of Gilbert's that ultimately gave us a new geology, and a more correct view of the earth? If Gilbert had not speculated about 'moonlets,' would Chamberlin have invented 'planetesimals,' and incidentally laid a firm foundation for our earth science?

FRANKLIN R. CARPENTER.

Denver, Feb. 12, 1904.

COST OF MINING ZINC ORE IN THE JOPLIN DISTRICT.

The Editor:

Sir.—Your reviews of the lead and zinc production and the Joplin district in your issues of January 7 and 14, and the discussions in more recent issues, have attracted my attention. The views expressed as to the cost of mining zinc ore in the Joplin district recall a problem which presented itself to me about a year ago.

Naturally enough, it is popular among the mine operators to refer the cost of mining to units of the product sold. A statement like the following is very simple and easily understood: Zinc ore sells for $34, the cost of mining and royalty amounts to $28, and the profit is, therefore, $6 per ton of zinc ore. This method of calculation may not be objectionable as applied to a particular mine producing ore of uniform richness, but it is readily shown that to generalize with such estimates of cost may be very misleading.

It costs practically the same to mine and mill material yielding 5 per cent of clean zinc ore as it does if the mine-run ore yields 10 per cent, but the operating cost referred to a ton of product in the former case is about double. The royalty charges, on the other hand, are a definite percentage of the receipts from ore sales, and are, therefore, proportional to the selling price and amount of clean zinc ore produced. The determination of the cost of production of a ton of zinc ore may be further complicated when a considerable part of the product of the mine is lead ore. The price of both lead and zinc ore are subject to changes from week to week, and are possibly chargeable also with different rates of royalty.

The table given herewith was calculated to meet just such a problem under conditions where the margin of profit was small, and likely to be altogether wiped out by a drop of a few dollars in the price of either lead or zinc ore. The mine-run showed a very uniform yield of 2.3 per cent zinc ore and 1.1 per cent lead ore, calculated from the results of milling 12,277 tons. Although the yield varied fractionally from day to day, the average for any month did not vary more than 0.1 per cent from that adopted in the preparation of the table; the figures represent the calculated net cash yield per ton of mine-run after the payment of royalty. Out of these amounts the cost of mining and milling is to be paid.

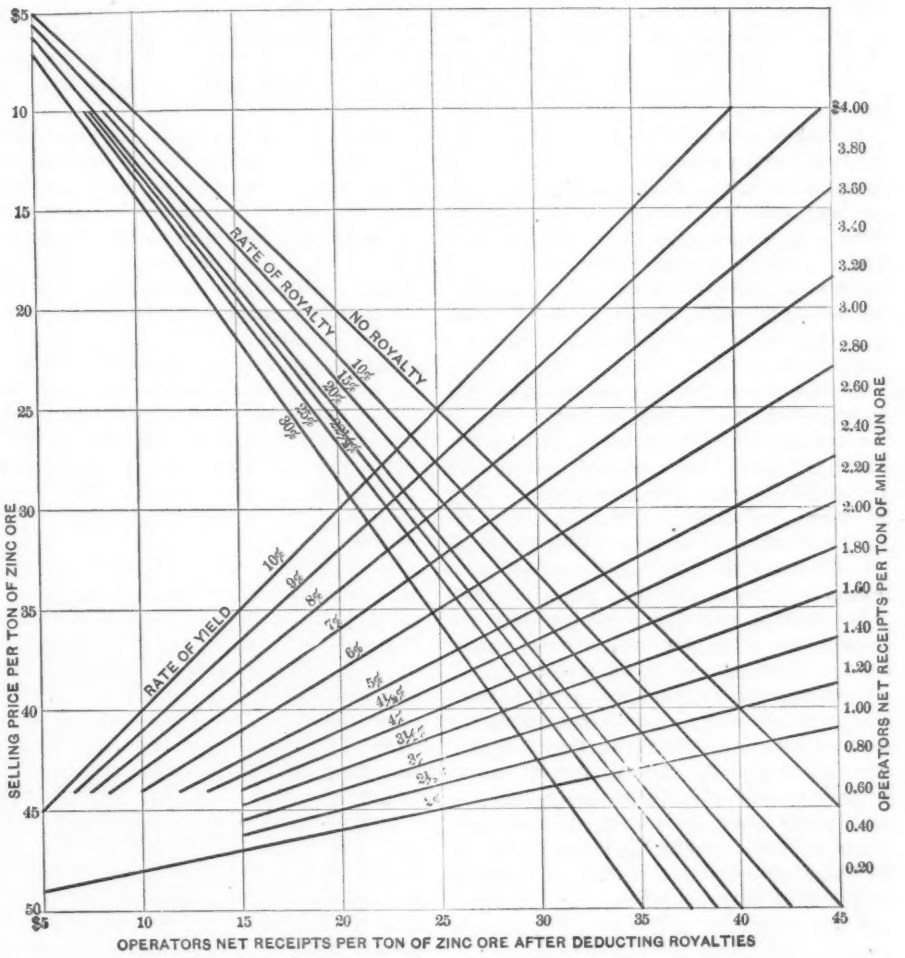
The use of the table may be illustrated by an example: Assume that zinc ore is selling on a $28 basis for 60 per cent ore; that the ore contains some iron, and must pay a penalty of $2 per ton, fetching, therefore, $26 per

ton in the bin; and that lead ore sells for $25 per thousand pounds in the bin. Under these conditions, a reference to the table shows the net cash receipts to be equivalent to $1.033 per ton, and, if the operating expense is $1 per ton, the margin of profit is 3.3c. per ton of ore mined and milled. Should zinc ore prices decline $2 per ton, then receipts would fall to $0.992 per ton, and the mine would show a small loss. Since the cost of mining is given by our books, a reference to this table affords at once the data for an accurate estimate of prospective gains or losses under ruling current prices for lead and zinc ores, and makes prompt action certain, if changes in prices demand it.

The table is useful only for the particular combination of yield and royalty assumed, but a similar table may be prepared to represent any other combination of conditions. When a mine produces zinc ore alone, or lead ore alone, the problem of determining costs is simpler and lends itself very nicely to representation by a diagram. Such a diagram for zinc ore is presented herewith.

The selling price per ton of ore is represented on the vertical scale at the left of the diagram, the rates of royalty are represented by one set of diagonal lines, and the rates of yield of clean zinc ore, expressed in per-cents of mine-run, are represented by another set of diagonal lines. The horizontal scale at the bottom shows the operators' net receipts per ton from the sale of the zinc ore, after deducting royalty, and the vertical scale at the right expresses the operators' net receipts per ton of mine-run for any combination of prices, royalty and rate of yield. Out of these amounts, the operator is to pay his working costs and make his profit. The use of the diagram is explained by two examples, one, wherein the net receipts per ton of mine-run is determined for an assumed combination of price, royalty and yield, and the other in which, the working costs, royalty and yield being assumed, the selling price is determined, at which costs and receipts would just balance. If the mine yields both lead and zinc, the net receipts per ton of mine-run may be determined for each separately, preferably for convenience, by different diagrams, the sum of the two being the total receipts per ton.

by the following example: Assume the selling price of zinc ore at $30, royalty 20 per cent, yield 5 per cent, operating costs $1 per ton of mine-run. Take $30 on the scale of selling prices at the left, and follow the horizontal line to the 20 per cent royalty diagonal, then follow the intersecting vertical line to the bottom of the diagram, on which we read $24, which represents the operators' net receipts per ton of clean zinc ore sold, after deducting royalties. Now take $1, on the vertical scale at the right of the diagram, follow the horizontal line to the 5 per cent yield diagonal, then follow the intersecting vertical line to the bottom line, on which we read $20. This represents the working cost on clean zinc ore, and the profit must be, therefore, the difference between $24 and $20, namely, $4 per ton of zinc ore sold. This will be seen to correspond with the calculations in the first example on the diagram. Assuming that 100 tons of mine-run are handled daily, the product will be 5 tons of clean zinc ore, and the profit by the first method is figured on 100 tons of mine-run at 20c., namely, $20, and by the method just explained, the profit is on 5 tons of zinc ore at $4, or $20, as before.


SELLING PRICE PER TON OF ZINC ORE
OPERATORS NET RECEIPTS PER TON OF MINE RUN ORE
OPERATORS NET RECEIPTS PER TON OF ZINC ORE AFTER DEDUCTING ROYALTIES
RATE OF ROYALTY
NO ROYALTY
RATE OF YIELD

COST DIAGRAM FOR JOPLIN ZINC ORES.

TABLE OF NET CASH RECEIPTS PER TON OF ORE HOISTED AND MILLED AFTER PAYING 10% ROYALTY.

YIELD OF ORE ASSUMED AT 2.3% JACK (BLENDE) AND 1.1% LEAD (GALENA).

Jack Price Per Ton.	Lead Price Per M.	$20	$21	$22	$23	$24	$25	$26	$27	$28	$29	$30
$15.....		$0.707	$0.727	$0.747	$0.766	$0.786	$0.806	$8.026	$0.846	$0.865	$0.885	$0.905
16.....		0.727	0.747	0.767	0.786	0.806	0.826	0.846	0.866	0.885	0.905	0.925
17.....		0.747	0.767	0.788	0.807	0.827	0.847	0.867	0.887	0.906	0.926	0.946
18.....		0.769	0.789	0.809	0.828	0.848	0.868	0.888	0.907	0.927	0.947	0.967
19.....		0.789	0.809	0.829	0.848	0.868	0.888	0.908	0.928	0.947	0.967	0.987
20.....		0.810	0.830	0.850	0.869	0.889	0.909	0.929	9.949	0.968	0.988	1.008
21.....		0.831	0.851	0.871	0.890	0.910	0.930	0.950	0.970	0.989	1.009	1.028
22.....		0.851	0.871	0.891	0.910	0.930	0.950	0.970	0.990	1.009	1.029	1.049
23.....		0.872	0.892	0.912	0.931	0.951	0.971	0.991	1.011	1.030	1.050	1.070
24.....		0.893	0.913	0.933	0.952	0.972	0.992	1.012	1.032	1.051	1.071	1.091
25.....		0.913	0.933	0.953	0.972	0.992	1.012	1.032	1.052	1.071	1.091	1.111
26.....		0.934	0.953	0.974	0.993	1.013	1.033	1.053	1.073	1.092	1.112	1.132
27.....		0.955	0.974	0.995	1.014	1.034	1.054	1.074	1.094	1.113	1.132	1.152
28.....		0.975	0.995	1.015	1.034	1.054	1.074	1.094	1.114	1.133	1.153	1.173
29.....		0.996	1.016	1.036	1.055	1.075	1.095	1.115	1.135	1.154	1.174	1.194
30.....		1.017	1.037	1.057	1.076	1.096	1.116	1.136	1.156	1.175	1.195	1.215
31.....		1.038	1.058	1.078	1.097	1.117	1.137	1.157	1.177	1.196	1.216	1.236
32.....		1.058	1.078	1.098	1.117	1.137	1.157	1.177	1.197	1.216	1.236	1.256
33...—		1.079	1.099	1.119	1.138	1.158	1.178	1.198	1.218	1.237	1.257	1.277
34.....		1.100	1.120	1.140	1.159	1.179	1.199	1.219	1.239	1.258	1.278	1.298
35.....		1.120	1.140	1.160	1.179	1.199	1.219	1.239	1.259	1.278	1.298	1.318

Values for lead ores may be shown on the same diagram, if desired, but since the relative yield of lead ores is often small, a different scale for the yield diagonals makes a more convenient and useful diagram.

Another use of the diagram is illustrated

The cost of mining and milling in the Joplin district varies from 80c. to $1 per ton of mine-run. This figure does not include any charge for redeeming the capital spent in opening up the mine and equipping it. When the ore-bodies are of considerable size, the mills of modern construction, and the operator has little or no pumping to do, these figures need seldom be exceeded, and in some cases costs may fall somewhat below the lesser figure. Between these limits, costs vary according to physical conditions, being high in hard sheet-ground, where air-drills must be employed, and the powder bills are large, and in soft ground, where the saving in the powder bills is offset by the cost of timber. Occasionally an operator is fortunate enough to have soft ore and a hard roof, and under such conditions the cost of mining and milling has been quoted as low as 75c. per ton.

Large areas of sheet-ground are now known in the Carterville-Webb City district. Most mines in this sheet-ground vary in yield of zinc ore from 2.5 to 5 per cent, although, in some cases, they are very much richer. Adopting $1 per ton as a fair estimate of the

cost of the mining and milling in this kind of ground, and referring to the diagram, we get the prices of ore at which the mines of different rate of yield will come into profitable production.

According to rate of royalty, from 10 to 25 per cent.

Ore yielding 5	per cent	will pay, when	the zinc ore	sells at	$22.20	to	$26.70
Ore yielding 4.5	per cent	will pay, when	the zinc ore	sells at	$24.70	to	$29.70
Ore yielding 4	per cent	will pay, when	the zinc ore	sells at	$27.80	to	$33.40
Ore yielding 3.5	per cent	will pay, when	the zinc ore	sells at	$31.80	to	$38.20
Ore yielding 3	per cent	will pay, when	the zinc ore	sells at	$37.40	to	$44.40
Ore yielding 2.5	per cent	will pay, when	the zinc ore	sells at	$44.50	to	$53.00[1]
Ore yielding 2	per cent	will pay, when	the zinc ore	sells at	$55.00	to	$67.00[1]

In making comparisons, the effect of quality on the selling price of zinc ore must be kept in mind, for, although the basis price for 60 per cent zinc ore may be $30 per ton, one mine may produce ore of so high a grade that it finds ready sale at $34, whereas another mine may produce ore containing mundic and will fetch, according to the assay, from one to several dollars less than the basis price.

The foregoing data serve to emphasize the fallacy which may develop by basing costs on the tonnage of zinc ore sold. The richer mines yielding 7 to 10 per cent. and upward are exceptions among the general run of Joplin mines, and those which are running on ore leaner than 5 per cent. doubtless constitute the majority. When ore prices advance beyond $25, the 4.5 per cent. and 4 per cent. mines start up, and when prices go to $32 the 3.5 per cent. mines begin to produce, and at $37 the 3 per cent. mines are worked.

Each successive class offers to the market more expensive ore, and consequently the average cost of production for the entire district, referred to the cleaned zinc ore, seems to advance nearly in proportion to the advancing ore prices. The cost of mining per ton of mine-run remains, however, practically unchanged, except for the effect of changing prices of labor and supplies.

W. SPENCER HUTCHINSON.

Boston, Feb. 1. 1904.

A NATIONAL BUREAU OF MINING.

The Editor:

Sir.—I was a little surprised to see in your issue of February 18 the letter on 'A National Bureau of Mining.' No doubt it is policy to give your correspondents full liberty of discussion, but even an editor can hardly be expected to allow them to advocate his own extinction. If the Bureau of Mining is to work on the lines Mr. Wolf indicates, it will put all the mining journals out of existence, since it will do free and at the public expense what you are doing for pay—besides running a free assay office and employment bureau. The able and hard-working editor will have no resource but to apply for a post in the new bureau. The same may be said of our numerous assayers and chemists; for who will pay them for an analysis, when he can get one from the Bureau for nothing?

Seriously, Mr. Wolf's proposition looks to me like an excessive development of the paternalism which is doing us so much harm, commercially and politically, in these days. Let us take up his seven propositions in detail, and see where they will lead us.

1. The Bureau should have a department prepared "to make accurate and rapid determinations, so that the results might be imparted with the least possible delay." Of course, the "advantages of such a department to the prospector are obvious;" but why should the miner or prospector get them from the Government? Is not the coal buyer equally entitled to government aid? Or the grocer, or the cotton manufacturer? Why are not all of us entitled to a share of the 'pie'? I say nothing of the incidental slur on the poor mining engineer, who, according to Mr. Wolf, has no time to make determinations, and so just calls a rock 'sedimentary,' or 'eruptive,' and lets it go at that, presumably to the great detriment of the prospector.

2. "Information as to the occurrence of orebodies, with their enclosing formations," is desirable of course. But the Geological Survey monographs give us a good deal of that already, and your own JOURNAL, with its many contributors, is adding to such information all the time. It is at the service of any one who will read.

3. Much the same may be said of this section. Mr. Wolf does not seem to know anything of the work done already in collecting descriptions; of the 'Mineral Resources,' published by the Geological Survey, of 'The Mineral Industry' volumes, or of the accounts of mineral deposits old and new, and the statistics published continually in your own JOURNAL and elsewhere. Evidently a new bureau could add little to this.

4. This clause of Mr. Wolf's plan is the gem of the whole. The Mining Bureau is to publish, not only a mining directory, complete and up to date, but also "statistics regarding mining swindles," and lists of "disreputable stock companies." No doubt the public would be protected; but who is to decide whether a new company should be entered in the 'Mines Directory,' or the 'Rogues' Gallery'? What a chance for the lawyers, in damage suits, injunction suits and the like, would be open here. What a chance for 'pull' and influence. The land-office would be nothing compared to it. And just fancy what a line for advertisements of stock. "The Great Bungtown Consolidated Gold and Diamond Mining Company has the full endorsement of the National Mining Bureau. See No. 105 of the Catalogue of Mines."

What a beautiful chance for 'graft' this directory bureau would present. Given a man of the right kind of intelligence, two or three years would enable him to take an extended foreign tour. He might visit many delightful countries, where extradition treaties are unknown, or perhaps settle down in Paris, in the colony of ex-dictators from South America, presidents of gold-from-sea-water companies and other accomplished 'grafters.' Evidently this bureau would present—for the right man—better opportunities than any other position in the gift of the Government.

5. This clause seems altogether superfluous. We have got plenty of manufacturers of mining machinery in this country who are much better able to push their own wares, and to give information concerning them than any Government bureau could possibly do. Moreover, I do not think that our reputable manufacturers would desire any help of this kind; they would much prefer to attend to their own business. If disreputable ones—and I regret to say there are a few of them—should chip in, here would be another chance for 'graft.' Any Government bureau had much better let this business alone. What a chance would be offered here, too, to push fake processes and the like.

6. Labor statistics are already gathered in a very competent way by the existing Bureau of Labor, which goes about as far as any Government work of this kind can well do. Free employment bureaus have been tried in one or two States, and, I believe, with not the most satisfactory results. It is hardly time for the National Government to get down to this kind of work. Like the American manufacturer, the American miner is usually pretty well able to look out for himself.

7. As to the reference library on mining, there is no objection; but, unless I am misinformed, the Geological Survey already has a pretty good library of its own, and an additional one would be only dividing forces.

Perhaps I have taken up too much space, but I could not resist the opportunity of protesting against this outbreak of paternalism, and I do not doubt that, on some points at least, a good many others will agree with me. The miner is quite capable of taking care of himself, and if the mining investor is not, it is a good deal his own fault. He cannot expect the Government to look after his pocket any more than it does after the investor in United States Steel, Amalgamated Copper, or United States Shipbuilding, for instance.

INVESTOR.

New York, Feb. 21.

ERRATUM. In the fourth paragraph of the third column in our issue of January 28, under 'Improvements in Cyanidation,' the solution used for testing should be stated as protochloride, and not perchloride of tin.

WAGES AND COST OF LIVING.—The New York Commissioner of Labor reports that the increase in the cost of living since 1897 is much less than the increase in yearly earnings. The average advance in wages since 1897 in the city of New York exceeds 10 per cent, and the percentage of lost time has decreased from 30.3 to 13.9, so that the average annual earnings have increased fully 36 per cent, which is much more than the increase in the cost of living.

HYDROMETALLURGY OF ZINC.—Among the recent patents are the following: K. Kaiser proposes to treat roasted ore with sufficient zinc chloride to agglomerate the mass, forming oxychloride. After drying, the mass is crushed and treated with chlorhydric acid, preferably while hot. In about 15 minutes all of the zinc should be dissolved and but little if any iron present. The solution is electrolyzed with insoluble anodes and zinc (or iron) cathodes, which may advantageously be made cylindrical and rotated (French patent, 333,773, July 11, 1903).

M. Malzac mixes oxidized ore with quicklime and leaches with ammonia water, draws off the solution and distills in a vacuum, precipitating zinc hydroxide suitable for use as a pigment (French patent, 329,079, February 4, 1903; addition, 2,001, June 29, 1903).

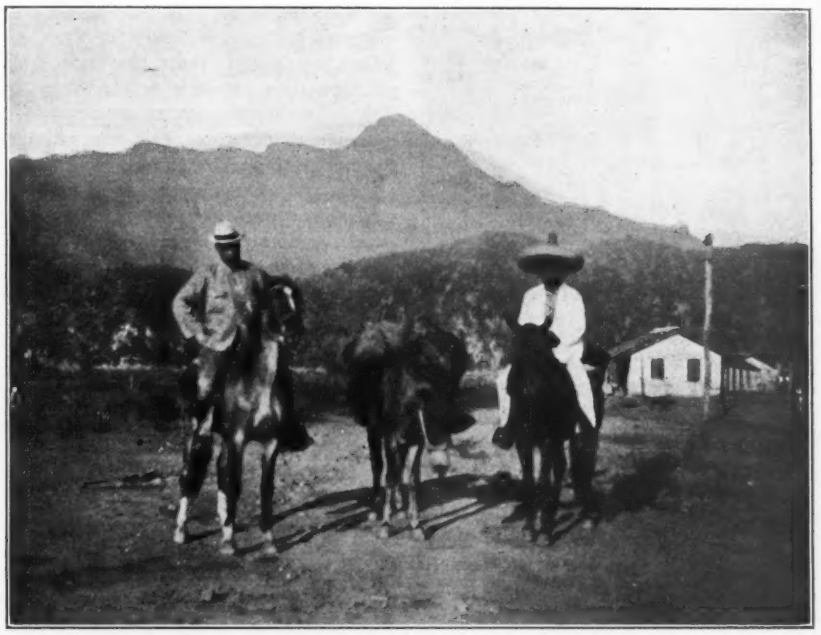
[1] Estimated, being beyond the limits of the diagram.

SOME SUGGESTIONS FOR TRAVEL IN NORTHERN MEXICO.

By A. R. TOWNSEND.

The present attitude of the miners' unions in the United States, and their arbitrary manner of dictating to mine owners, has caused many capitalists to turn toward Mexico as a possible field of operations. The result of this has been that many mining men, otherwise well equipped, find themselves face to face with the problems attendant upon travel in a country with the manners, customs and language of which they are unfamiliar. The writer, having had some experience in Mexico and South America, offers the following suggestions so that those who are entering Mexico for the first time may form a correct notion of what they are going to encounter, and be the better prepared. The thing that suggests itself first is the language, and it is natural that the less Spanish a man knows, the more difficult it will be to do what he wants and, more particularly, to get others to do what he wants. It is, nevertheless, astonishing with what little and rudimentary knowledge of the language it is possible to go miles through the country and generally manage to worry along in some fashion. If, however, one wishes to do any measure of business with the people, it is necessary either to know more or less of the language or employ an interpreter, who may be an unreliable stranger, making such a course one to be avoided. If a man only wishes to make a journey, and can afford to leave the arrangement of business to some one else, an ignorance of Spanish need not deter him. He should set about learning a few important words such as a man might need traveling on the mountain trails. In the cities it is surprising the number of Mexicans that know at least a little English. With a few words and an abundant use of signs, one can get along fairly well.

Practically all travel in Mexico, from a mining man's standpoint, is on mule-back. The mountains of northern Mexico form a barrier not yet pierced by any railroad or wagon road, so that journeys are made over rough and steep trails. This should be kept in mind in choosing an outfit. The average freighter can pack 300 lb. on each of his mules and keep them in good condition, but the *jornada* or day's journey of a freight mule is one-half or one-third the distance made by a fair rider. This being the case, it is a mistake to pack more than 200 lb. of baggage on any of the mules, and they will then be able to keep up with the saddle animals, without becoming worn out and useless. For this purpose there is nothing better than a small steamer trunk about a foot high, foot and a half wide and two feet long. One of them, when tightly packed with clothing, will weigh about 100 lb., and two just make a good cargo. Steamer trunks of this size are hard to buy, but they are made, and once secured, are a lasting source of comfort. They should be of the stiff type; flexible leather trunks, telescope cases, and valises will soon be rendered shapeless objects by the rawhides with which the *arrieros* tie on the packs.



ON THE ROAD IN MEXICO.*

If a man is going to Mexico to take a position at some mine and stay any length of time, let him keep the following in mind and not be too anxious to cut his baggage down too far. Many articles of personal use, which we are accustomed to find in the stores in any sizable town in the United States, are, in Mexico only obtainable in the largest cities, where they are sold at twice their cost in the United States, and even then are apt to be of some inferior European make. This is especially true of clothing in general and of footwear in particular. It is no exaggeration to say that any one going to Mexico for one or two years will do well to take enough shoes to last him all that time, unless he expects to be near a large city. In passing the custom house, it is likely that some of these things will require the payment of duties, but even with that paid, they will cost less than if bought in Mexico. On entering Mexico, all baggage is examined. The custom house officers are inclined to be lenient, however, especially towards men who bring nothing but their personal baggage, as it is known that Americans entering the country generally mean a profit to the Republic in some manner. If you can assume for the time being an attitude of deferential respect toward the custom house officer, coupled with an apparently insane desire to show him all your belongings, there is apt to be no trouble. This does not apply to liquor or tobacco, with regard to which the regulations are strict and closely followed.

In choosing clothing for use in the mining regions, remember that most of them are at altitudes of over 2,000 ft. and that the days will be warm and the nights cold in winter, and generally cool in summer. No one need bring blankets into Mexico, as good blankets are made in the country that cost less than articles of similar grade in the United States. Such clothing as a man would wear on a hunting trip in the States would be found suitable. For the lower regions where the *mesquit* is thick, leggings or boots will be found necessary to protect trousers from being torn while riding; a pair of cavalry gauntlets should be worn to protect the hands from thorns. A good felt hat is an excellent investment during the rainy season, and a pommel slicker such as is used in the West is indispensable. If a man expects to make an extended trip, involving a good deal of riding, an American saddle is worth getting; for a short trip it is hardly worth while. In buying an American saddle, it should be borne in mind that the average Mexican mule is smaller and has a narrower back than most cow ponies, and as narrow a tree as is obtainable should be selected. Mules are the most important item, and the hardest thing for a newcomer to obtain. At most terminal railway points there are forwarding agencies that make a business of supplying mules and *mozos* to travelers. These men are either Americans or Mexicans accustomed to deal with Americans, and can be dealt with safely. In renting a mule from a Mexican, never close the contract until the mule has been seen. If a trip occupying a month or more is expected, it is worth while to buy mules and sell them at a loss at the end of the trip, as the difference in price will not come to as much as the rent for a similar period. The prevailing prices of mule hire in the State of Chihuahua are a dollar per day (Mex.) for a cargo mule, a little more for a saddle mule, and a dollar a day for a *mozo*, the employer to supply him with food. One precaution to be taken is that of securing all the small change possible before starting. As one leaves the larger cities small coin becomes scarcer, and in the smallest towns and on the trail one constantly faces the alernative of paying more for something than is asked or else going without, the vendor invariably pleading that he has no change. A Mexican can accept, without any embarrassment, a dollar for an egg, if he judges the buyer to be ignorant enough and hungry enough to buy it. The best thing to do is to have a small sample sack, and while in the cities pay for small purchases in large coin, hoarding the small coin given as change.

Almost always the price that a Mexican asks for anything is more than he has any right to expect or than any Mexican would pay. In Mexico, as in other countries, the easy-going ways of Americans and their desire to conclude any transaction with the greatest possible dispatch are taken advantage of, much

*The illustrations do not represent the author, but another mining engineer who was kind enough to loan the photographs.—Editor.

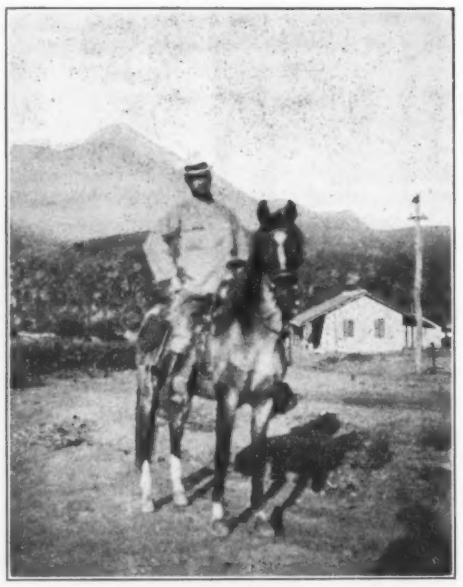
to the profit of the native. One must either sacrifice time to bargaining or pay more than a thing is worth.

It is customary in Mexico for everyone on the trail to carry a revolver. Considering the extent to which arms are carried, it is remarkable how little trouble there is. Highway robbery, as practiced in this country, is a thing unknown. Murder for purposes of robbery is sometimes committed, but the danger to Americans is small. It is the opinion of most men that the presence of a revolver renders its use unnecessary, and the sense of security that it brings makes it worth while to carry one. In some of the less traveled parts of the country there are enough deer to make it worth while to carry a carbine, but there is not as a rule enough game to warrant it.

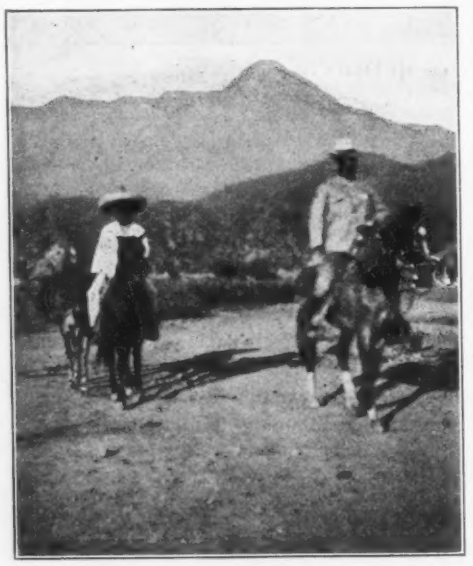
The *mozo* is a man that is employed to care for the mules and act as guide. He gets wood and water, saddles and unsaddles the mules, and puts on the packs. Many of them are incapable of performing more than this, while others make themselves useful about camp, do part or all of the cooking, and fulfill the offices of a well trained servant.

At starting point where many 'outfits' leave, good *mozos* can be secured, while in the mountains they are either unobtainable or are unsatisfactory. There are men in Mexico who make this their business, and some of them are worth more than they get. A *mozo* can do more to make a trip agreeable or disagreeable than any other single factor. Most Americans make the mistake of listening to their complaints, excuses and reasons, and feed them delicacies to which they are not accustomed and to which they have no right, thus spoiling them for men who know what they are entitled to expect. It is best to give them all they can eat of beans, *tortillas,* coffee, brown sugar and dried meat. Outside of this they should not expect anything, unless they are short of their regular rations, when they must be fed from whatever is at hand. It is well to look after the *mozo,* but a mistake to let him know that you have any interest in his welfare, else he will try and take advantage of you. The *mozo* is a servant, and neither the employer or employed should be allowed to forget it. There is no people more prone to take advantage of any tendency to unbend on the part of their employers, and a status once lost will never be regained. On the other hand, a surly or inconsiderate employer makes an unwilling servant. If your *mozo* decides to leave you, there is no authority that can be called in to make him finish the journey and comply with his contract; thus it is that a man sometimes finds himself facing the alternative of granting an altogether unreasonable demand or being abandoned in some desert place with his cargo and saddle mules on his hands. It is best to have as little as possible to say to the *mozo;* the man that starts in to learn Spanish from his *mozo* will soon find himself being told what he must do. The first day out is always in the nature of a test. It is then that a new *mozo* tries his employer to see how much he will stand, and it is also then when a *mozo* has just started on a new trip and is near the point where others can be secured that he will stand the most discipline. Everything done on the first day out establishes a precedent for the rest of the trip.

As to outfit: If a man expects to make a short trip of a few days and then remain at his destination, very little need be carried. A small box, say 12 by 18 by 8 in. will hold enough food for two men for a week, in addition to a coffee pot, frying pan, pot for boiling, cups, plates, knives, forks, and spoons. For a more extended trip a larger box and more elaborate set of cooking utensils is necessary. The boxes in which bottled beer is shipped are just the right size and shape to make a good



pack. A pair of these will make a suitable load for a cargo mule that has to keep up with the saddle mule. They should be reinforced at the corners, top, and bottom, the lid hinged on, and a hasp and padlock attached. If the trip is made during the rainy season, a piece of canvas should be provided for each box to protect its contents from the wet. In choosing supplies, by all means avoid canned goods. They



are most expensive and soon prove ruinous to the digestion. The ordinary Mexican bean is an excellent food and nourishing. Potatoes, dried fruits, rice, fresh meat when obtainable, and similar simple things that will commend themselves, should be adhered to.

The rainy season in most parts of northern Mexico begins some time in July and ends in September. This is the best time of the year to travel, up to the first of November, on account of the readiness with which drinking water and fodder for the animals can be found. The rain begins after midday and is apt to pour for a couple of hours. After a lull, a fine drizzle begins about dark and lasts for a few hours more. This makes a pommel slicker carried on the saddle absolutely necessary; also a tent to protect one at night. It is best to carry a small cot of the folding variety common in Mexico. It makes it unnecessary for the traveler to sleep either on damp ground or on the dirty floor of a native house, if he puts up there. As the nights in the mountains, even in the summer, are cold, a good roll of bedding should be carried. In order that this may be dry, a gum blanket should be rolled about the other blankets and a sheet of canvas about the whole to keep the gum blanket from being torn.

In traveling along the trail, adopt a routine to be followed daily. Some men start and ride till some time during the afternoon, and then make camp for the night, eating no lunch except what they can carry in their pockets. When the days are short, this is probably best, as poor time is made before or after daylight. During the longer summer days it is much more agreeable and less fatiguing for the mules to make an early start, travel till midday, then stop, unload, and rest the animals for a couple of hours before proceeding. In either case the moment one wakes up the *mozo* should start the fire, then bring in the mules and put on their pack saddles. Breakfast should be eaten to get it out of the way, and then everything can be packed, loaded, and a start made. The points to be considered in choosing a stopping place are wood, water, and fodder for the animals. If the *mozo* knows the road, he can tell where these things are obtainable and so advise at any point in the road whether it is best to push on or not. Better time can be made by camping out, as a rule, than stopping in native houses. One is then in the position of a guest, and cannot ask for what is wanted with the same freedom as when camping. This refers to houses of the people of the better class; those of the poorer people are so dirty that it is always preferable to camp out. As a rule time cannot be made by hurrying the mule faster than a certain pace. It is apt to exhaust him so that it becomes necessary to stop before the end of the day. This is because of the roughness of the trails. The man who wishes to make time must start early and ride till late, allowing the mule to take his accustomed pace, and sparing him as much as possible by walking down the steep places; the distances and time made by experienced riders is remarkable.

But few medicines are advisable for even a long trip, and for a short one leave them behind, and figure in the risk as a necessary evil. Some liquor to be kept for emergency, some absorbent cotton, a small roll of clean bandages, a little salve, jamaica ginger, quinine, laxative pills, and castor oil about suffice. In the hot country, where there is danger of snakebite, a small bottle of ammonia or other reliable antidote is to be recommended.

Among Americans in Mexico there is a sort of freemasonry, so that in the mountains one can go to any camp where a mine is run by Americans and ask to be put up over night. As a rule they are glad to receive a stranger, provided he is not a professional loafer, and the further away the camp the gladder they are to see a new face.

In dealing with the Mexicans there are several things that should be kept in view. In all their business they aim to make the most out of every transaction, quite regardless of the reputation for unfair dealing that it may bring them. With us many smaller details of business are recognized customs; with them all these should be arranged for. According to their lights they are not dishonest. To tell a man a lie, and have him believe it, proves the liar a smart man; to be found out proves the man lied to smarter than was expected. A man detected in a lie or beaten in any transaction does not feel the dishonor or the loss as much as the reflection on his astuteness. If, on the other hand, an American shows a disposition to look into details and to weigh carefully what is said to him, he will be told the truth more than he would otherwise. Time with us so important, with them is unimportant. With us a man is willing to sacrifice some small advantage in a business in order to conclude it. With the Mexicans any amount of time is worth sacrificing in order to gain ever so slight an advantage.

It is a serious mistake for an American to 'get even' by any trickery. It is generally recognized that Americans are honest in their dealings and it is expected of them; to be thought tricky will simply cause a man to lose the respect of the Mexicans. Strict justice is necessary, and a tendency to be charitable merely means that a man will be taken advantage of. Mexicans are accustomed to carry into all their affairs a politeness of manner that we do not employ. While this politeness means nothing, yet its absence is quickly noted and generally construed to mean a hostile attitude on the part of the foreigner. A manner that would be regarded as business-like in the United States is generally regarded as offensively rude in Mexico. The Americans that have settled in Mexico are like those elsewhere—good, bad, and indifferent. Those married to Mexican wives are apt to be hand in glove with their wives' relatives, though there are many exceptions to this.

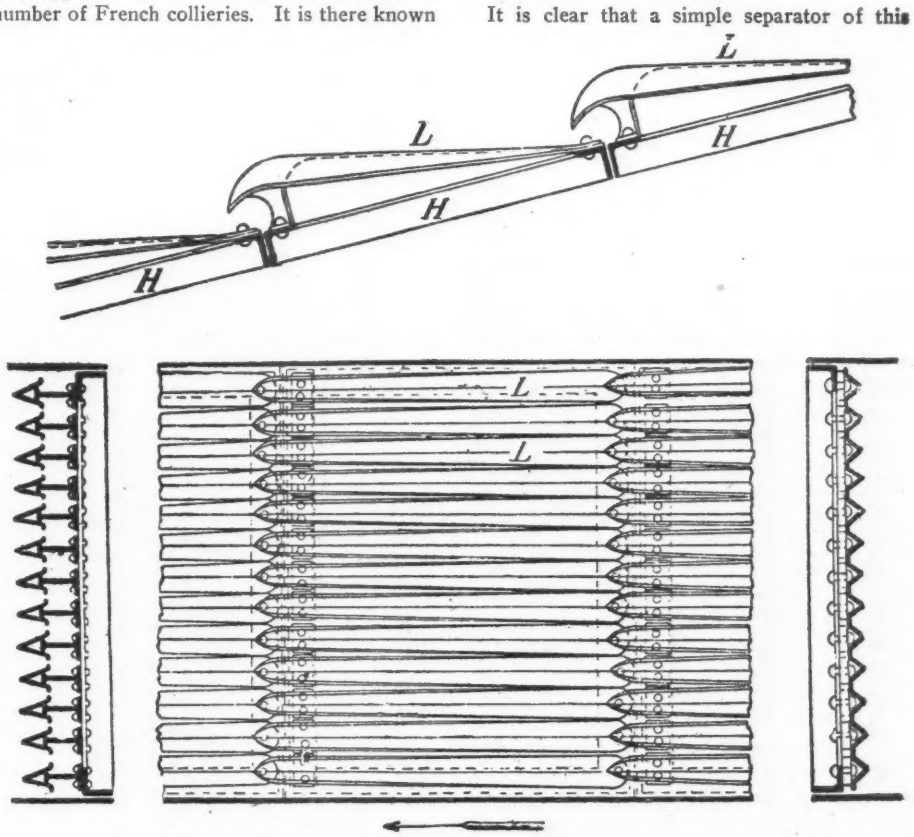
The above observations purport to be nothing more than opinions that the writer has gathered as a result of his own eperience. There are doubtless many exceptions to the above statements. It is to be hoped that these suggestions may prove useful to men entering Mexico for the first time, and where they are ill-considered, the writer will stand corrected.

STAFF.—This composition, which was used so extensively in the construction of the buildings for the Chicago Exposition in 1893, and has been employed even more extensively in the buildings for the St. Louis Exposition, is a mixture of ordinary plaster of paris (calcined gypsum) with a suitable binding material. The latter must be rather loose and coarse, to allow the plaster to percolate through it and afford the necessary surface for adhesion. Manila fiber, which costs not to exceed 4c. per lb., is commonly employed. As a building material, staff is well-nigh fire-proof. Frost does not hurt it. Rain has little effect upon it. A drip injures it. The short durability of the staff plaster on exposition buildings is due to their inadequate foundations and the shrinkage of the sheeting to which the plaster is applied. If spread on expanded metal lathing, staff plaster would doubtless prove durable. Staff and cement do not give a good mixture.

MECHANICAL SLATE-PICKERS.

For separating anthracite coal and slate mechanically there are two methods, the wet and the dry. The wet is by launders with riffles at which the slate collects, by washers of the trough and Luhrig types, or by jigs; while the dry is by mechanical slate-pickers. It is the latter method that will be considered in this article.

The simplest method of separation is by a screen, with bars set at certain distances, according to the size of the coal. The bars are narrower on top than on the bottom. By giving a joggling motion to this screen, the flat pieces of slate are tipped on edge and fall through the bars, while the cubical pieces of coal pass on. This type of screen has been introduced at a number of French collieries. It is there known as the Allard bar screen. Screens that allow cubical pieces of coal to fall through and flat pieces of slate to pass over are used at some of the Pennsylvania anthracite mines. The accompanying cut shows the construction of the bars, L L, in the Allard screen.



ALLARD SCREEN.

Mechanical slate-pickers of an entirely different type are in wide use in the anthracite region. They act by gravity and friction; that is to say, they are based chiefly on the difference in weight and in frictional resistance between coal and slate. Coal has a bright surface, and tumbles and slides down a sheet-iron chute much more easily than the rough-surfaced pieces of slate. The first of these frictional pickers, the Thomas, was patented in 1875, and modified in 1878 and 1893. The friction plate, traversed by the coal and slate in the Thomas separator, is generally a slab of coarse-textured slate, or grit, about 1 in. thick and 18 in. wide, and sometimes 3 ft. long, although a metal place can be used. The feeding device is a piece of iron passing through a slot in the chute. This piece of iron is given a reciprocating motion by an eccentric. When depressed, the slate and coal pass down the chute to the inclined slab of stone; when elevated, the flow is temporarily stopped. Thus, the material, though fed in bunches, has a partial distribution that prevents, to some extent, the coal and slate passing down the chute in such manner that many such pieces would not come in contact with the frictional surface. To prevent too bunchy a flow Thomas used a drag, a piece of some flexible material hung over the head of the stone slab. The coal in cubical fragments, with a smooth surface, tumbles and slides over the slab more rapidly than the heavy, flat, rough surface slate. At the end of the stone is an opening with an adjustable slide; the coal, traveling faster than the slate, jumps this opening and falls into a different chute from the slate.

It is clear that a simple separator of this type gives but a two-part separation, having no provision for bony coal. To remedy this, the pickers were often arranged in tandem, the first being adjusted to pick out pure coal or slate, etc., and the next to take out bony coal and mixed coal and slate. The pickings from the second separator are sometimes sent over another picker; but, as a general rule, the bony coal from the second separator is picked over by a couple of boys, to remove any pure coal. The capacity of one of these Thomas separators is about 300 tons per day.

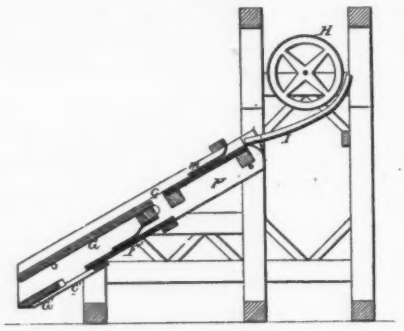
The best results obtained with the Thomas separator, while handling stove or chestnut sizes of anthracite, are stated to be about 20 per cent. of coal in the slate, with the slot so set that the material going into the coal chute was just too dirty to pass inspection. Anthracite coal to pass inspection, that is, to be accepted by the inspectors who are supposed to see that the coal shipped is up to grade, must not, if of chestnut size, contain over five per cent slate and five per cent bony; if stove size, not over four per cent slate and three per cent bony; if egg, not over two per cent slate and two per cent bony; if broken, not over one per cent

slate and one per cent bony; while lump coal is supposed to be clean. Of the small or steam sizes, pea coal must not have over 10 per cent slate; if the coal is of good quality, the bony is included in the coal; if of poor quality, it is included in the slate. Buckwheat size must not have over 15 per cent, and rice not over 20 per cent.; but the latter size is seldom inspected, and sometimes not inspected at all, it bringing only 25c. per ton at the breaker.

The Thomas picker handling chestnut size coal from several seams containing 40 per cent. slate and bony, and set to give 20 per cent. of bony in the slate, is said to give about 20 per cent. of bony and slate in the clean coal chute. Hence, hand-picking must be used in the clean coal chute to get the coal to pass inspection, and 20 per cent. of bony in the slate is too high. Two boys are required to pick the coal out of the slate and four boys to pick the slate and bony out of the coal. The Thomas picker, though widely introduced, had the defect that with damp or wet coal, which collects dust and slides much less freely than dry coal, too much coal goes into the slate chute. Again, in the picker, as first brought out, the slab of slate used as a separator was altogether too short to give the best separation, it being only about 14 in. long. Many of the Thomas pickers that were put in anthracite breakers have been taken out, and those used form a rather unimportant part of the equipment of the breakers. The accompanying diagrams show the principle of the original Thomas separator, H being a revolving screen, not part of the picker, I a curved chute, F and F' the slate slabs, m the drag of flexible material and C and C' the openings for slate. The pitch of the slate slabs is adjustable.

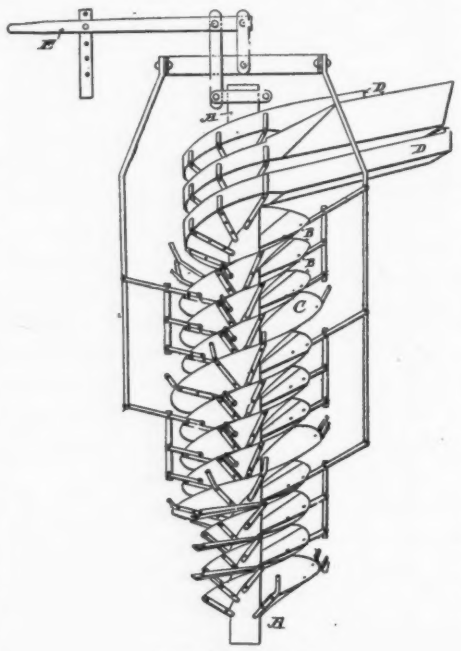
Other inventors have worked on the principle of frictional differentiation, and the result is a number of separators with varying devices for adjusting the feed, the inclination of the inclined stone or plate and the partitions that separate the openings at the bottom of the chute. The number of separating stones or plates in a single separator was increased, making it more bulky, but allowing a sort of three-part separation. Succeeding the Thomas separator in the anthracite region came the Emery. It was installed at a large number of breakers, and is still used as an integral part of breaker equipment. Practically it is simply an elongated Thomas picker several times repeated. The frictional surface is longer, being made in various lengths up to 3 and 4 ft., and of steel and slate. The feed device has a rotary instead of a reciprocating movement. It consists of a revolving metal cylinder with a quarter segment removed, but the material is delivered in bunches. The latest type of Emery picker, called the Duplex picker, consists essentially of three or four Thomas pickers arranged behind or above one another. The coal starts on the first chute, which usually has a run of 8 ft. on a pitch of 6 in. per ft., runs over a slate slab, and the clean coal falls into a compartment and goes direct to the loading pocket. The mixed bony and slate are fed to the second chute, which has usually a run of about 4 ft. on a pitch of 6 in. per ft. In case too much slate goes into the bony compartment, the separating plate is tilted up and the slate opening widened. All the heavy impurities falling into this opening go over two other chutes and slabs, which are called repickers, and, theoretically, all the material going off the end of the last picker into the bony chute will be clean bony, while that falling into the slate chute will be clean slate and rock.

A large number of Emery pickers of the original and of the Duplex type have been introduced in anthracite breakers, and their use



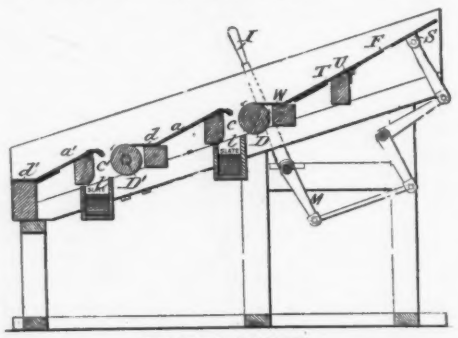
THOMAS PICKER.

is probably increasing. It is said, however, that the bony coming from the bony chute at the last separator is not clean and contains too much coal. It often contains an average from 40 to 80 per cent. of bony, though much



PARDEE PICKER.

better results may be had by feeding carefully, or by putting through only coal from one vein. It is also said that the clean coal from this picker is sometimes hardly clean enough to pass inspection, when a picker is working under normal conditions taking coal from sev-



ZIEGLER PICKER.

eral seams. This is particularly the case if the coal is wet; with dry coal the slate and rock run pretty clean, from five to 20 per cent of coal in the slate, with a machine running on stove size and set to make five to 15 per cent of slate in the bony. Under average conditions, with a machine set to run 15 per cent coal in the bony, there may be as high as 15 per cent of bony in the coal, and hence it is often necessary to employ two or three boys on the coal chute to pick out bony enough to enable the coal to pass inspection.

The Ziegler picker, which has been used at a number of anthracite breakers, is of the same general type as the Thomas. The coal first passes over a perforated plate, as in a number of other pickers, to remove dust and small particles. The pitch of the incline is about 4½ in. per ft. At the lower end of the separating chute is a roller, this being practically the only important difference from the Thomas separator. The roller was expected to increase the separation of the coal and slate, but in practice it is said to have proved of little value, except where the coal is very wet, and even then it takes out flat coal with the slate. In one breaker in the anthracite region 27 of these Ziegler pickers have been arranged one behind the other, and yet the percentage of coal in the slate is at times high, while to get the coal clean enough to pass inspection, boys have to pick out the slate.

The accompanying cut of the Ziegler picker shows the feed chute F, the pitch of which can be changed through the lever I M; the separating plates T and a and the rollers D and D' The slate falls through the openings c and c' into the slate chutes l, the clean coal going off at d'. The platforms W and d check the fall of the slate.

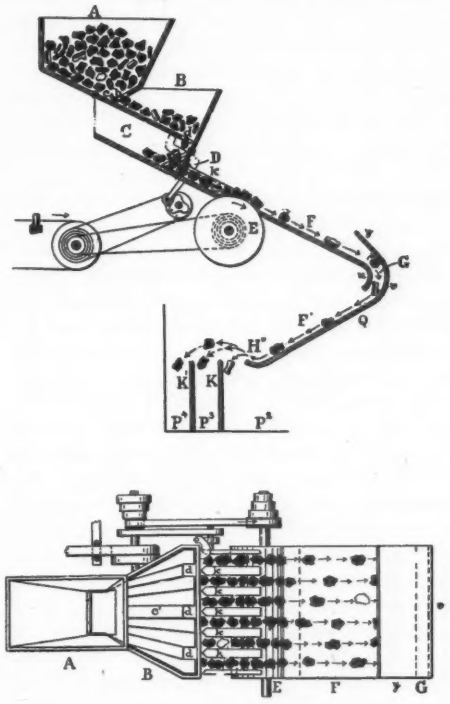
The first picker devised that made a three-part separation at the first pass was the Caryl & Snyder. It had at the foot of the slate slab a metal plate tipped upward, called a projector, which greatly increased the arc traversed by the falling material, thus enabling the slate, bony and coal to drop in separate chutes. This separator, while using a valuable principle, was never introduced in practice, and is of interest as leading up to the Langerfeld, described later. In the cut, B is the slate slab, E the projector, the angle of which is altered by the lever G. The clean coal falls into chute I, and the bony into H.

A picker very different from the Thomas, though employing the same principle for separation, is the Pardee spiral chute, invented by F. Pardee, of Hazleton, Pa. This is like a large worm gear, standing vertically, with a pitch of from 24 to 26 in. The gear proper is of plates of sheet steel or bronze fastened to a central post. The coal and slate are fed into the top of the spiral and begin to run around the plates or wings. The coal, being lighter and smoother than the slate, increases in speed as it tumbles and slides round, until its centrifugal velocity carries it off the edge of the spiral into a wider spiral; the slate and bony, sliding more slowly, hug the central post in descending, and finally fall into another chute. The width of the wings is varied according to the size of the coal to be run through. A picker of this type requires a height of 10 to 11 ft., and is about 4 ft. in diameter. To get a three-part separation, the mixed slate and bony are run through another picker. Thus, it is usual to have the Pardee separators in pairs, the upper picking coal, and the lower, or re-picker, taking out bony. To increase the capacity, as many as three spirals, each with a separate feeding chute, may be set on one post, the pitch of each spiral being the same

and products the same. The Pardee picker works extremely well on coal that is dry and is of uniform quality. With coal from several veins, with wet coal, and particularly with coal that is damp enough for dust to cling to it, the separation is not as good, and boys frequently pick the coal after it; but there are breakers in the anthracite region that use this picker on wet coal, and the foremen report a pretty clean separation. The original Pardee spiral had no other provision for decreasing the pitch of the various plates of which the spiral is composed than the insertion of wedges of wood or metal, or pieces of slate, between the plates, a slow and clumsy method. Recently the picker has been improved by an attachment permitting the pitch of the plates to be altered by levers connected with a controlling lever at the top. The Pardee chute is probably the most satisfactory mechanical picker that has been introduced to any extent in the anthracite regions.

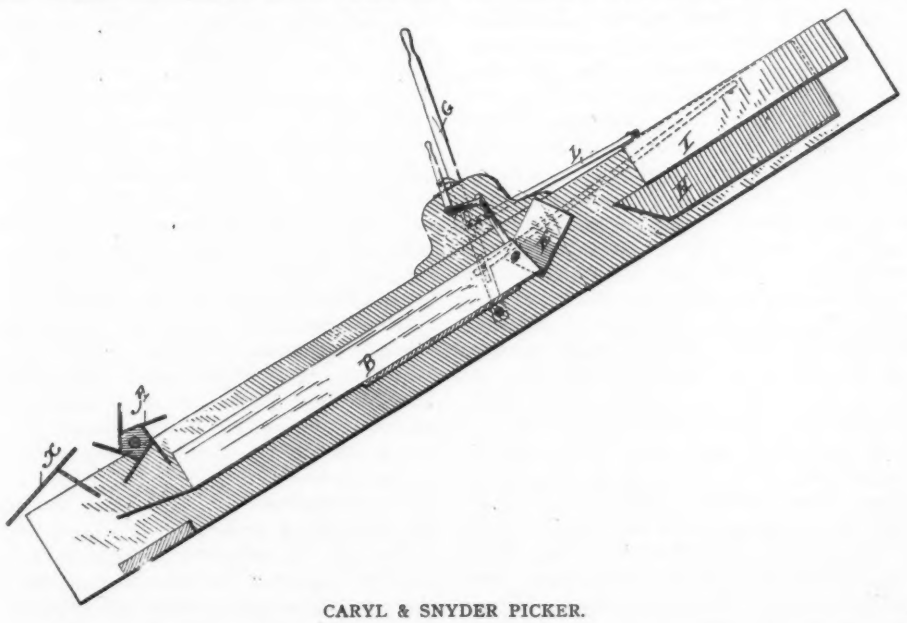
The cut shows three separator spirals, B, on a central post, A. The spirals are fed at D. The large spiral chute receiving the clean coal is C. The pitch of the spirals B can be changed by the lever E.

A picker employing the Carl & Snyder principle of a three-part separation at one pass, by increasing the arc traversed by the falling coal and slate after leaving the separating chute, has been devised by A. Langerfeld, of Scranton, and is in operation at the breaker of the West End Coal Company, at Mocanaqua, Pa. This picker has several features in which it differs from the Thomas, the Emery or the Ziegler. It has an inclined chute sharply bent about over half way down, and a feeding device designed to feed each piece of coal or slate separately, thus allowing each piece to come in contact with the metal. The object of the bend is to prevent any piece having slate on one side and coal on the other from sliding the entire length of the chute on one side. Besides the deflector at the bottom of the chute, the Langerfeld separator has an inclined metal plate, parallel to the arc of projection of the falling material. This plate increases the range of separation, and lessens the breakage of coal from hitting the sides of the partitions dividing the slate, bony and coal chutes. The general principles of this separator are shown in the accompanying cuts, in which A is the chute from a revolving or shaking screen, B a feed chute regulated at D. This feed chute is intended to prevent a lumpy flow of material by the raised strips d. The fingers k compel the material to pass over the roller E in separated lines, the roller preventing pieces from over-lapping as they start



LANGERFELD PICKER.

down the chute F. Each piece is thus fed separately. By the bend G all pieces of flat coal or slate are overturned and slide down the chute Q. The chutes F and Q are of steel; the projector for widening the arc traversed by the falling material is shown at H', clean coal falling fastest down the chute traverses the widest arc after leaving the projector and drops into chute P⁴, bony, K, drops into chute P³ and slate or mixed coal and slate into chute P². The metal plate parallel to the arc traversed by the coal, bony and slate is not shown.



CARYL & SNYDER PICKER.

As to the effectiveness of this separator, it may be said that the one at the Mocanaqua breaker running on stove coal has a capacity of 1,000 lb. per minute. The coal fed to it contains, on the average, eight per cent slate and 12 per cent bony. The coal falling in the coal chute passes inspection; that is, does not contain over four per cent slate and three per cent bony, while the material in the bony chute runs from five to 10 per cent coal and from two to five per cent slate, and the rock chute contains one to five per cent coal and 10 to 20 per cent bony. Different grades of coal from different veins are run through the separator; some of the coal is damp and some is dry, hence the differences in percentages shown; but the results are so encouraging that it is probable that a number of these separators will be installed at a large anthracite breaker, plans for which are now being drawn.

THE CANADIAN MINING INSTITUTE.

In our issue for January 21 we published a preliminary program for the annual meeting of the Institute. A later circular from the secretary's office gives further particulars. The meeting will begin in Toronto on Wednesday, March 2. A business meeting will be held at 10:30 a. m., when the annual reports will be presented and other necessary business transacted. Sessions for the reading and discussion of papers will be held at 3 p. m. and 8 p. m. on the same day. On Thursday, March 3, sessions will also be held at 3 p. m. and 8 p. m., while at 10 a. m. there will be a special session for the presentation of papers by student members of the Institute. On Thursday also, a special meeting will be held for the purpose of organizing a chemical section of the members of the Institute; this meeting will be under charge of Mr. W. Dixon Craig, of Midland, Ontario. On Friday, March 4, there will be a business meeting at 10:30 a. m., and at 3 p. m. a final session for the reading and discussion of papers. A special session for the presentation of student papers will precede the business meeting in the morning. The annual dinner of the members will be held at the King Edward Hotel on Friday evening.

On Saturday, March 5, the members will visit Niagara Falls, where special arrangements have been made for the inspection of the power house and electro-metallurgical works.

In addition to the papers already noted, the following have been promised for this meeting:

Rossland Ore-deposits; E. B. Kirby, Rossland, B. C.

Mining and Smelting in the Boundary District; Frederick Keffer, Anaconda, B. C.

Acid Making from Pyrrhotite; E. A. Sjostedt, Sault Ste. Marie, Ont.

Colliery Explosions; William Blakemore, Nelson, B. C.

The Development of an Electro-Metallurgical Process; Dr. W. T. Gibbs, Buckingham, Quebec.

The Exploration of Ontario Iron Ranges; E. B. Willmott, Sault Ste Marie, Ont.

Notes on the Zinc Problem in British Columbia; A. C. Garde, Sandon, B. C.

The History and Exploitation of Native Silver and Other Ores in the Animikie; Major R. G. Leckie, Sudbury, Ont.

A New Area of Copper-bearing Rocks in the Eastern Townships of Quebec; John A. Dresser, Montreal.

Minerals Containing Radium in Quebec; J. Obalski, Quebec.

MINING IN BRITISH COLUMBIA IN 1903.

BY OUR SPECIAL CORRESPONDENT.

If an actual diagram were prepared, indicating the development of our mining industry during 1903, it would at once be noticeable that the extreme fluctuations all appear to have been recorded during the first half of the period under review, and that since that time progress has been steady and continuous. The outlook for mining in British Columbia at the beginning of 1904 is, in fact, brighter and more decidedly promising than it has been for many years.

The year 1903 opened badly, for only a few weeks had passed, when work in the copper mining centers of Kootenay was paralyzed by the strike of coal-miners at Fernie, resulting in the suspension of operations at the collieries and cutting off from the smelters of the Rossland and Boundary districts the supply of fuel upon which they depended. Just at this juncture the organization was effected of the Provincial Mining Association, including in its membership all interests having to do, directly or indirectly, with the mining industry. At a convention held in Victoria during the last week in February, at which were present some 300 delegates from all parts of the province, a number of important questions affecting the industry were debated, and, among others, the relations of capital and labor. As a practical outcome a committee was appointed, their expenses being defrayed by the Government, to proceed to Fernie, to investigate the matters in dispute, and, if possible, reconcile the conflicting interests with a view to a permanent settlement. After sitting for some days, the committee was successful, the settlement of the strike being directly attributable to its efforts. Further than this, it was able to bring about an arrangement between the colliery company and its employees, whereby trouble in the future was provided against. No sooner, however, had the labor difficulties in East Kootenay been adjusted, than a second strike was declared among the coal miners of Extension and Cumberland on Vancouver Island, the miners at Nanaimo having also previously struck. These strikes lasted from May to August, when they, too, were finally settled, on a basis which provides against the recurrence of like industrial disturbances for at least two years. But these labor troubles undoubtedly tended largely to restrict the output during the year. In the Kootenays not only coal and coke, but gold-copper production, was decreased; while on the coast colliery owners were unable to take advantage of the exceptionally favorable conditions for marketing their product which the removal of the United States import duty on coal afforded.

In addition to labor troubles there were other conditions that militated against mining progress. In the Slocan and East Kootenay the situation as regards silver-lead ores has been for some time far from encouraging, the reason being the cost of marketing the product, since the American market was closed to British Columbian producers. But further complications arose early in 1903, owing to a further decline in the price of metals and, in consequence, production from all the larger mines was either entirely suspended or reduced to a minimum point. Again, the weather conditions at the opening of the season were most inimical to successful alluvial gold recovery. Cariboo, Atlin and Omineca, all suffered from a short water-supply, although in the Cariboo the effect appears to have been the most disastrous.

But bad luck and misfortune disappeared at mid-summer. The whole aspect of affairs then changed for the better, and ever since there has been abundant evidence of the general revival of mining throughout the province. Among more recent occurrences which contributed to this, may be mentioned the Dominion Goverment grant to lead-producers of $15 per ton on lead; the apparently successful solution of the problem of profitabiy treating the low-grade silicious ores of Rossland by the introduction of the Elmore oil concentration process, the discoveries at Poplar creek; and the proof, by the payment of a first dividend, by the Granby company, that the great low-grade ore-bodies of Boundary are capable of being profitably worked. Apart from these events, further indications of improvement may be found in the increased, and increasing, demand for mining properties; the number of transactions that have been made during the period, particularly in the Boundary, Ymir, Nelson and Lardeau districts; the fact that production of copper-gold ores and of coal is greater than it has ever been before; and, lastly, the number of mines that have been, and are being, adequately equipped with machinery.

Brief references to the progress made in each district will give a general idea of the mining development of the year:

On the Coast, coal mining, except for the partial suspension of operations during the strikes, has been decidedly active, and production has been beyond the average of recent years. Export conditions have been good, and there has also been a considerable local demand by the Island smelters for the coke manufactured at Union. At Nanaimo, the Western Fuel Company has done a considerable amount of development work, and has also added largely to the machinery equipment of their colliery. At Comox, a seam of anthracite coal of excellent quality, 4 ft. thick, was exposed in No. 7 slope at a vertical depth of 80 ft. in December. This is the first discovery of anthracite on the Pacific coast. The coal, in limited quantities, is to be placed on the market early this year. In metalliferous mining, activity has been restricted chiefly to the developments at Mount Sicker on Vancouver Island; while at Texada operations have been steadily conducted with gratifying results. On the west coast of Vancouver Island, prospecting has been carried on at San Juan, Barkley Sound, Sidney Inlet and Anderson Lake; and at Quatsino the Yreka mine has been partially developed, equipped with an aerial tramway and has shipped ore to the Crofton smelter. At Gribble island, a promising copper property has been exploited and is shortly to become productive. Little has been attempted this year in mining the large ore-deposits at Howe Sound. Near Vancouver, on Lynn creek, a number of promising prospects, both of gold-copper and zinc, have been located and development commenced. Production from the Coast this year will show a very considerable increase, for which the Tyee, Lenora and Van Anda mines are chiefly responsible. The Tyee in particular has established a record, and is probably yielding larger profits than any other copper property in the province.

Coming next to the northern placer fields of Omineca, Cassiar and Atlin, we find that conditions have altered very little in respect to the two former, but that in the case of the Atlin district, important developments have taken place. In Omineca, a few hydraulic mining companies have worked in a tentative fashion, while, in one or two instances, operations have been practically suspended. In the Cassiar, the only mining undertaking of any magnitude has been that conducted by a local syndicate at Thibert creek; the result this year was, however, encouraging, over $25,000 in gold having been recovered in a short season, despite a shortage of water. Atlin's gold production in 1902 was officially placed at 20,000 oz., valued at $400,000. The estimates of last year's yield have varied from $430,000 to $500,000; but it is probable that the 1903 output will not exceed the previous year's return. Effort has been directed rather toward the equipment of properties than the obtaining of immediate returns, and results will be more apparent next year than they are this. The work of installing plants and of careful prospecting has been in progress on the McKee, Sunrise, Birch, Boulder and Deeks hydraulic claims for the past three years, being completed only this season. On Boulder and Spruce creeks the old channels have been located, the outlook for drift mining being here most encouraging. But the future of the Atlin seems to depend more than all else on the successful application of dredging methods in mining at low cost over large areas. It is claimed that the known gold-bearing area, in which values are most evenly distributed, has a radius from the town of Atlin of over 25 miles, and that gravel containing 20 c. to the cu. yd. can be profitably handled. A beginning in dredging has been made, the British American Dredging Company having installed an electric plant capable of operating five large dredges; one of these appliances, of exceptional size and power, has been built and is ready for operation. Some attention is now being paid to quartz mining, and several promising prospects are being developed. The district suffered early in the season from scarcity of water, while a miners' strike of short duration, however, occurred about the same time.

On the Fraser river at Lytton and elsewhere, one or two dredges have been operated with moderate success.

At Kamloops, the result of the year's work has served to confirm the previous high opinion entertained of the promise and value of the Iron Mask mine, on Coal Hill, the only property in the district to be extensively exploited. The syndicate owning this mine entered into an arrangement last summer with a London company, to provide additional capital for the construction of suitable reduction works and other plant required to place it in a productive condition. The agreement was conditional on a favorable report being rendered by an independent engineer engaged by the latter company. The subsequent examination proving most satisfactory, contracts have already been awarded for the equipment of the mine. The only other metalliferous mine of importance, upon which operations were carried on in 1903, was the Copper King, which commenced shipments of ore to the Crofton smelter in November. On Tranquilla creek, a tributary of the Thompson river, a dredge was steadily operated during the entire season, working with two 12-hour shifts. The channel was dredged to a depth of 18 ft., the best values being found, however, in a streak of clay at 15 ft. depth.

Gold production from Cariboo in 1903 is estimated as having a value of between $300,000 and $350,000, or from 25 to 30 per cent less than the 1902 yield. This result is attributable to exceptional winter and spring weather, and consequent short supply of water. At the Consolidated Cariboo, at Bullion, for example, the run lasted for 53 days only, the clean-up realizing less than $60,000, or about a fifth of what the property is capable of producing. At some of the smaller properties, however, the shortage of water was not felt, and round Barkerville, in particular, some satisfactory returns were obtained. Efforts are still being made to tap the ancient river system by deep-level mining, the results so far, at Slough creek and Willow river, being encouraging. During the summer expert investigation of the Horsefly and Bullion gravels was made for osmiridium and platinum. These tests are said to have given results sufficiently good to warrant the installation next year at Bullion of special appliances for saving the metals. Recently, the heavy rains of September and October permitted the resumption of operations at a number of the smaller mines, this assisting in increasing the year's production of gold from the district.

In the Revelstoke district, mining operations have been chiefly confined to prospecting and development work in the Big Bend. A number of creeks in this section, notably McCullough and French, are auriferous, and attention is now being directed toward working them by hydraulic methods. The quartz prospects are also promising, though their development is retarded by the lack of transportation facilities. Mica is also found here in payable quantities, and arrangements are being made for marketing this product.

During the year some attention has been directed to the development of mineral claims in the Vernon district, which at one time appeared to promise well; two or three prospects on Marshall mountain and another opposite Okanagan Landing are developing satisfactorily. The ore is generally free-milling and carries good values, according to assay returns. On the McPhail group a small experimental stamp-mill was set up in November, but as yet no clean-up has been made.

No mining section of the province has made greater advance in 1903 than the Lardeau, which includes the mining areas at Ferguson and Trout lake, at Camborne, and the new gold-fields of Poplar creek and Ainsworth. Prospecting has been active and a number of installations of machinery have been made. Of these, mention may be made of the new 20-stamp combination silver mill at the Silver Cup; an aerial tramway at the same mine; an aerial tramway 8,000 ft. in length at the Great Western, and the stamp-mills installed at the Eva and Oyster-Criterion mines at Camborne. Production this year from Trout lake and Ferguson has not, however, been considerable, although probably greater than in 1902. Producers were occupied in development, in the installation of machinery, and in blocking out ore in readiness for shipping. Toward the close of the year the Camborne, or Fish creek, camp became regularly productive, the stamp-mills at the Eva and Oyster-Criterion being put in commission, while a small clean-up was also made at the Goldfinch. Although some years ago the Poplar creek section was known to be well mineralized, it was not until the summer that attention was directed to the locality by the discoveries of rich gold-quartz on Gold Park and later on the Lucky Jack group. While, as yet, there is no proof that these rich surface ores will maintain their values in depth, the work so far done favors the presumption that the lodes are persistent. The chief importance of the discoveries, however, rests in the fact that prospecting has been greatly stimulated.

An examination of conditions in the Slocan reveals a less satisfactory state of affairs. Production was smaller than it has been since the inception of silver-lead mining in the district, the output being approximately but 14,000 tons of galena and 2,000 tons of zinc ores. However, since the announcement was made that the Federal Government had agreed to pay a bonus on lead, a number of mines have been re-opened and development work has been in steady progress; while at several mines large installations of machinery have been made. But it will not be until next year that any increase in production will be apparent. In connection with the industry in the Slocan, two events should be noted; one, the successful introduction of electrolytic silver refining at Trail, and the other the profitable mining of zinc ores, which heretofore were a detriment, constituting a metallurgical difficulty for which the owner was taxed by the smelters on his shipments of galena. In consequence of the rise in the market value of spelter, several of the Slocan miners have been able to make shipments of zinc-bearing ores to Kansas and other centers of the zinc industry in the United States. At the Payne mine, a special magnetic separating plant has been installed for the concentration of the mine products. From the Slocan City mining division—the dry-ore belt as it is termed—production was far below that of the preceding year, the cause being, to some extent, bad management of one of the larger mines, which was closed down early in the year, but has since been re-opened under lease. Shipping operations were also suspended at the Arlington, in 1902 the heaviest producer in the district, pending the establishment of local reduction works for which arrangements have been made. In this district the leasing system has become general, eight properties being now worked under leasehold rights, including mines that proved unprofitable under company management.

In the Nelson district, the situation has shown improvement. The Silver King mine, which was worked under lease, again yielded profits. On Morning mountain some half-dozen mines have been actively exploited, as against one only in 1902. The closing down of the Poorman, however, is a matter of regret. At Erie, the Arlington, which was supposed to be valueless, has been worked profitably under the leasing system, and, on several other claims, stamp-mills have been installed during the year. At Ymir, several mines have entered the productive class for the first time, and excellent returns have been obtained from the Willcox, which has now been placed on a paying basis. The other shipping mines have been at Atlin, Elise, Gold Cup, Ore Hill, Porto Rico, Fern and Ymir. The Ymir mine has not been profitable, but as a new body has been encountered at the 500-ft. level, and working costs have been reduced to a minimum, it is hoped that the outlook will improve. At the Foghorn, the vein was encountered at a depth of 900 ft., while the opening up and equipment of the Hunter V., an enormous deposit of low-grade ore averaging in value $3 in gold and 2 oz. silver, is also noteworthy. Another stamp mill was installed in the Ymir district during the year, there being now six mills in operation.

Rossland's production of approximately 400,000 tons of ore during 1903, is a record achievement. It constitutes an increase of 20 per cent. over the 1902 tonnage, despite the falling off in shipments during the spring, consequent upon the strike at Fernie. During the year less than a dozen mines have shipped ore, three or four of which only are responsible for the largely increased output, namely, Le Roi, Le Roi No. 2, Centre Star and War Eagle. But the matter of tonnage is of secondary importance, in comparison with the advance that has been made toward finding a solution of the difficult problem of turning to profitable account the larger bodies of both silicious and ferruginous ores which occur in this district. So far as the silicious ores are concerned, it now seems reasonably certain that the Elmore process is peculiarly adapted to their successful treatment. A 50-ton mill of this type was installed by the Le Roi No. 2 company during the summer, and about the middle of October the first runs were made. These proving satisfactory, the War Eagle and Centre Star companies and, later, the company operating the White Bear mine, decided on the erection of similar mills, with capacities of 50 and 100 tons, respectively. After conducting a series of exhaustive experiments, covering a considerable period of time, the War Eagle and Centre Star companies have also commenced the installation of a specially designed 200-ton plant near Trail for treating the lower grade silicious ores. While as yet the efforts put forward to discover a means of economically treating the ferruginous ore of the camp have not been equally successful, experiments that have been made with the Hendryx process, a development of cyanidation in conjunction with the use of electricity, have had good results. In November the erection of a pyritic smelting plant at the Velvet mine was decided upon by the directors of the company. During recent months, work was resumed at several mines upon which operations have been suspended, and at others this year large and complete hoisting and compressor plants have been installed.

The Boundary still continues to be the premier district of British Columbia, its production in 1903 representing very nearly 700,000 tons, or an increase of 25 per cent over 1902. This district is able, for the first time, to include among its mines, two which this year have paid substantial dividends. One of these mines, the Providence, has a small but high-grade ore-body, averaging about $100 to the ton; the other, the Granby, is an enormous low-grade ore-body averaging probably not over $5 a ton. From an industrial standpoint the dividend paid by the Granby company is of the greater significance. Until now expert opinion has been divided as to the possibility of profitably mining the low-grade ores of the Boundary district. The distribution of a dividend by this company finally settles the question, and removes all doubt as to the splendid future awaiting the full development of this great mineral area. In addition to distributing profits among its shareholders, the Granby Company has paid out of profits the costs of improvements, including additions to the smelter at Grand Forks, and the development

and equipment of the mines during the past two years. At the mines, an innovation was introduced in 1903 in the utilization of steam-shovels for the handling of the ore broken down in the quarries, while the capacity of the smelter at Grand Forks was largely increased by the addition of two furnaces, making six in all, capable of treating 2,000 tons of ore per day. At the Snowshoe, and other mines near Phoenix, development work has been continued concurrently with production. Near Greenwood, the Mother Lode, owned by the B. C. Copper Company, made heavy shipments of ore during the year, and the company is now enlarging its smelter and adding a converter plant. The Boundary Falls smelter has also been remodeled and improved. The development of the high-grade ore-bodies near Greenwood has been a gratifying feature.

At Camp McKinney, the Waterloo mine has been actively exploited since early in the summer and machinery has been installed. It is now proposed to treat the ores by the new Hendryx method. The Cariboo mine has been operated the greater portion of the year. At Fairview, work has been carried on at the Stemwinder, Morning Star and Dominion. Some fair returns have been received from the Stemwinder, and an effort is being made to raise necessary additional capital by an issue of preferred stock. In the Similkameen a good deal of prospecting work has been in progress, but the most important developments have taken place at Camp Hedley, where, at the Nickel Plate mine, installations of machinery have been made, including a 40-stamp mill, now nearing completion. The district is still suffering from the lack of adequate transportation facilities.

In addition to the large coal production from East Kootenay, the silver-lead mines at Kimberley and Moyie have, in the past, contributed considerably to the mineral output of the province. During one year, production from the St. Eugene, alone, equaled the aggregated silver-lead output of the Slocan district for the same period. The conditions unfavorable to silver-lead mining bore hard on East Kootenay, the ore in this region being generally lower in grade than in West Kootenay. As a result, the showing made by the East Kootenay lead mines in 1903 is very poor, one mine only, the North Star, having made any considerable output, while the St. Eugene was entirely unproductive. It is satisfactory, however, to note that the lead bounty has exercised a beneficial effect and that early in 1904 a general resumption of mining operations is to take place. At the Crow's Nest collieries, the output, despite the strike in the spring, has materially increased, a large expenditure having been made in adding to the machinery equipment, while a number of additional coke ovens have been erected. The Crow's Nest Pass Coal Company, which heretofore has enjoyed a monopoly, is shortly to experience competition in the coal trade, a new company having recently been organized at Montreal with a capital of $4,500,000, to develop and operate the extensive coal-measures in the Fording river area.

More attention was paid to placer and hydraulic mining in East Kootenay in 1903 than for some time past, and both on Wild Horse and Perry creeks activity has been most marked. In the Windermere district, a good deal of quartz-mining has been in progress. The Paradise mine made several important shipments of ore, while the Ptarmigan was also productive.

A word concerning the future may be said in concluding this brief review. Outsiders are too prone to regard the mining stock market as indicating the position of industry, and to watch quotations. In a comparatively new country, like British Columbia, this is an utterly unreliable method. During the first excitement of new discoveries, speculation is at its height, and share-values consequently are inflated to an absurd degree; all sorts of foolish mistakes are committed, advantage is taken of the credulity of the public, companies are formed with insufficient working capital, or with working capital but without mines of value. Promoting is rampant, and the frauds being generally better advertised than the legitimate undertakings, investment is greater in the former than in the latter. Naturally, the bigger the boom, the more disastrous the subsequent reaction. It is six years or so since there was a British Columbia boom. It was at its height in 1898 and 1899. To many it would seem that there has been ample time since for recovery; in a country, such as South Africa for example, where the ores are easily treated and the geological and other conditions uniform and easily mastered, this would be true, but in British Columbia we have had complex problems to grapple with, such as metallurgical, transportation and marketing obstacles and great natural difficulties. Taking this into consideration, the progress made by the country in the last two or three years has been remarkable, although but imperfectly appreciated. In the last six months the advance has been more decisive than ever, yet it has not been in any way reflected in the speculative markets. The time, however, is approaching when the position of British Columbia, as one of the important mining regions of the world, will be conceded. The province contains rich silver-lead mines, extensive copper-gold deposits, large coal areas, and auriferous alluvial gold deposits; with these, we have no reason to doubt the future.

MELTING POINTS.—According to H. Pélabon (*Comptes Rendus*, 1903, CXXXVII, 920-922), the sulphide of antimony, Sb_2S_3, melts at 555° C., the sulphide of bismuth, BiS, at 685° C., and the sulphide of silver, Ag_2S, at 845° C.

RUSSIAN COPPER MINES.—At present more than one-half of the production of copper in Russia is made by the mines in Transcaucasia, which has been the seat of copper mining for many centuries. The largest mine in the province is the Kedabek, owned by the firm of Siemens, of Berlin, and is situated in the district of Elizavetpol. It has been in continuous operation during the last 36 years. The output in 1900 was about 4,500,000 lb. metallic copper, but it declined in 1902 to about 3,400,000 lb., owing to exhaustion of the ore-reserves. New ore-bodies have been found recently, assuring a continuance of operations for some time to come. The second mine in point of output, owned by a French company, is situated at Alawerdi in the district of Bortschalo. Operations on a large scale have only been undertaken recently, and the present production is about 2,000,000 lb. annually. There are a number of smaller mines in the province, most of which are controlled by local capital. The industry employs 3,700 men.

THE DETERMINATION OF GOLD IN CYANIDE SOLUTIONS.*

By A. PRISTER.

This is a colorimetric method, which depends upon the fact that the free cyanide of potassium is destroyed with hydrochloric acid; the ferro-cyanide of zinc, ferro-cyanide of copper, and the sulpho-cyanides being precipitated.

The double cyanide of gold and potassium $KAuCy_2$, containing all the gold, is decomposed by the addition of a few drops of cupro-salt (De Wilde's method). As this reaction, in order to be a quantitative one, requires a certain time, it was found advantageous to combine it with Pellatan's method; therefore, the acid solution is boiled for five minutes, the cupro-salt and a few drops of sodium sulphide (Na_2S) are added:

$$2KAuCy_2 + 2CuCl = 2AuCuCy_2 + 2KCl.$$

As the copper salt is in excess there is a secondary reaction, the formation of copper sulphide, thus:

$$CuSo_4 + Na_2S + 2HCl = CuS + 2NaCl + H_2SO_4.$$

The double salt of copper and gold is insoluble in the acid solution and precipitates together with the copper sulphide, the ferro-cyanide of copper, ferro-cyanide of zinc, and sulpho-cyanides already mentioned.

This precipitate is filtered and re-dissolved in a cyanide solution (KCy). By the addition of zinc powder to the cyanide solution obtained, the double salt of copper and gold is decomposed with precipitation of the gold:

$$AuCuCy_2 + Zn = Au + Cu + ZnCy_2.$$

The ferro-cyanide of zinc, the ferro-cyanide of copper, the sulpho-cyanides and the zinc cyanide remain in the solution—a very important fact, because they, as well as the ferro-cyanides, are solvents of the gold, and if remaining in the solution where the gold is ultimately precipitated with tin chloride, they might interfere with the reaction by dissolving the gold.

After filtration the gold, silver and copper remain and the excess of zinc; these are treated with dilute hydrochloric acid:

$$Au + Ag + Cu + Zn + 2HCl = Au + Ag + Cu + ZnCl_2 + H_2.$$

The zinc chloride is filtered away, and the precipitate consists of the three metals, and sometimes some sulphur from the copper sulphide. By treating with aqua regia, the gold, copper and some zinc become chlorides, and in this solution the gold is precipitated by stannous chloride, with formation of the purple of Cassius. The gold is estimated by comparing the color obtained with standards made for that purpose.

The reagents employed are:

The Copper Solution. One part of copper sulphate ($CuSO_4 + 5aq$) in 10 parts of water; add 2 parts of salt (NaCl) and some copper shavings; boil for 10 minutes and after cooling add some acetic acid.

Protochloride of Tin (Stannous chloride, $SnCl_2$). Dissolve tin in strong hydrochloric acid, by warming; the presence of a piece of platinum will facilitate the solution of the tin; after dissolving it should be kept in a bottle with a few grains of tin added.

Zinc Powder. The zinc powder obtained in commerce is good enough for this purpose.

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*Abstract from paper entitled, 'A Colorimetric Method for the Determination of the Gold in Cyanide Solutions.' By Professor A. Prister. The *Journal* of the Chemical, Metallurgical and Mining Society of South Africa. December, 1903.

Cyanide of Potassium. Prepare a solution of 3 to 5 per cent.

Sodium Sulphide (Na_2S). Prepare a solution of 1 to 2 per cent.

Aqua Regia. Four parts of strong HCl to 1 part of strong HNO_3.

Colorimetric Standards. Dissolve a weighed quantity of pure gold in aqua regia, and dilute to 200 c.c. By diluting a portion of this solution with water, to which a few drops of caustic potash and glycerine have been added, every desired standard can be obtained.

The practical working of the method is as follows: Take 100 c.c. of the cyanide solution to be assayed. If very rich, divide the final solution before reading, if very poor it is better to operate upon 200 c.c., acidify with hydrochloric acid, boil for a minute or two, add a few drops of the copper solution (to be certain that enough copper salt has been added, put a drop of the solution on a piece of filter-paper previously moistened with ferro-cyanide of potassium, a red-brown color will appear if enough copper is present); an excess of copper can be safely added; to the boiling cyanide solution add a few drops of sodium sulphide. Boil for 5 minutes, allow to settle, decant through a filter the greater part of the solution. Keep as much of the precipitate as possible in the beaker for the following solution in KCy. The precipitate in the beaker, as well as that on the filter, is dissolved in about 25 to 30 c.c. of KCy. (The previous addition of a few drops of caustic potash will facilitate the dissolution of the precipitate; if the bulk of the precipitate is too big, a gentle warming of the cyanide will facilitate the solution). Wash with a little water, then filter. To the clear or turbid solution of the ferro-cyanides and double cyanide of copper and gold 1 or 2 grams of zinc powder are added, and solution gently warmed. In about half an hour the gold is precipitated, the solution being filtered through the same filter already used. Keep as much of the zinc as possible in the beaker for the following treatment with diluted HCl. The excess of zinc is now dissolved, as said, in diluted hydrochloric acid; the reaction being accelerated by gentle warming when the first violent reaction is over. Filter off the zinc chloride formed as soon as the violent evolution of hydrogen is finished.

In the beaker and on the filter there will be the gold, silver, copper, some sulphur and some zinc; 10 c.c. of aqua regia are sufficient for their solution. As the greater part of the metals have been retained in the beaker, dissolve the metals there with cold aqua regia; afterward warm it to boiling point and pass repeatedly over the filter.

After repeating the operation three or four times all the gold is dissolved; the filter is washed with a little water and collected in a test tube marked with 20 c.c., and stannous chloride is then added. If the solution is rich, the color will appear directly, otherwise after a few seconds; if the solution is too rich for reading, dilute it and take an aliquot part.

The method is a quantitative one, and will give higher results than the fire assay, if carried out with the necessary precautions. An excess of reagents should be avoided. An excess of sodium sulphide will precipitate such a bulk of copper sulphide that its solution in KCy will be prolonged, and also the precipitation with zinc. Keep the bulk of the precipitate in the beaker, as hereby time is saved in the following solutions and filtrations, and gold losses prevented. If calibrated test tubes are not at hand, take test tubes of approximately the same diameter. If the solutions are richer than 1.5 dwt., it is preferable to dilute it, because it is easier to read poorer solutions. Do not warm too much the solution where the zinc is precipitating the gold. A beaker of 150 c.c. is most convenient. Use the same filter, in order to save time and prevent gold losses. The simplest way to make the standards is to dilute 10 c.c. of glycerine with 10 c.c. of caustic potash (or soda) with 180 c.c. water. Take 5 c.c. of a gold chloride solution, which, diluted with the above glycerine solution to 20 c.c., will correspond to about 12 grains. If the gold chloride solution is preserved in a dark bottle protected from the sun, it will keep for a long time unaltered.

TIN MINING IN THE OZARKS—A BIT OF HISTORY.

By H. A. WHEELER.

Very few of the present generation are aware of the tin excitement that originated in Madison county, Missouri, on the eastern flank of the Ozarks, in 1874. Yet there are parties still alive in St. Louis who not only keenly remember the inroads made in their bank accounts, but who still believe that there is tin in the porphyry of Tin mountain. For they saw it smelted out of samples they collected themselves, and as "seeing is believing" in Missouri, they do not understand why the present generation of mining engineers are not profitably working this tin deposit. The excitement was tremendous on the discovery, by an Englishman, of reputed valuable deposits of tin in the dark porphyry that abounds in Madison county, where knobs and hills of the Archean granites and porphyries protrude through Cambrian sandstones and magnesian limestones. At Tin mountain, which is some 10 miles south of Fredericktown, or about 130 miles south of St. Louis, this dark porphyry was reported to be as rich in tin as the famous black mud of the Hot Springs district, Arkansas, was more recently reputed to be rich in silver; and when the latter metal became unpopular, the same black mud suddenly changed to rich gold ore. The black mud did serve as a very substantial medium of transfer of cold cash to the pockets of some local swindlers, who rarely bothered to go to the expense of salting the samples.

The Tin mountain rock not only gave high assays in genuine tin buttons, but tin was always found, no matter who took the samples, and in most encouraging quantities—at least in the assays made at the mine. If some skeptic suggested salting, the investigator was invited to take possession of the tunnel and secure samples from fresh faces by blasting. A well appointed and convenient assay laboratory was placed at his disposal, and the suggestion made that no one be allowed to approach from the taking of the samples to the completion of the assay. You were even invited to bring down your own assay reagents, to eliminate any doubt as to the local supply being reliable. With such precautions to secure unquestionable results, with so much stress laid on seclusion, is it any wonder that the layman was thoroughly convinced by the innumerable assays that invariably gave large buttons of genuine metallic tin? Samples taken and assays made with the most rigorous care and watchfulness gave quite as high results as the careless grab samples selected by the promoters. "Seeing is believing" to most capitalists, and the greatest excitement resulted. St. Louisans promptly showed their faith by buying the land, drove a tunnel to open up stoping ground, and erected a concentration mill and smelter. Several hundred thousand dollars were invested in the enterprise, which was regarded as safe as a government bond, yet promised unprecedented profits from being the only tin producer in the United States.

There was one party whose name now shines very brightly, Prof. Shepard, of Ironton, Mo., who denounced the scheme as a fraud, and stated that the rock contained no tin. But too many people had seen the tin extracted before their eyes, and from samples that they had freshly blasted out without allowing any one to approach them, so he was severely denounced by the public and the daily press as a 'knocker' and blackmailer, and utterly ignored. After about two years of excitement and golden dreams, and an unstinted, generous outlay of money, the mill was finally started, and a large party of stockholders went down from St. Louis to get pieces of the first ingot of tin. The smelter was started on the heavy, black, so-called 'tin-stone' concentrates, and out ran—white iron. The English promoter vanished; the abuse and anathemas that were previously heaped on Prof. Shepard were now transferred to him; but he had their money, and they had the experience. It resulted in the failure of one of the largest commercial houses in St. Louis, and severely crippled several other capitalists who were too sagacious and too economical to employ a competent expert; for had they not seen the tin smelted out of the rock?

The place was promptly abandoned, the plant has long since been scrapped, and to-day very few know why a rugged hill in a wild portion of the eastern Ozarks is called Tin mountain. For many years it was not known how the salting had been perpetrated; but after time had outlawed all danger of criminal action it finally leaked out, and it was as ingenious as it was bold. Like all well supplied assay laboratories, a large stock of crucibles was carried which were ranged around the room on a high shelf to season or dry out. Only the very best crucibles were employed, of graphite. In the bottom of these crucibles shallow holes were bored with a club-borer, into which oxide of tin was carefully tamped, and then smeared over with graphite powder. It left the crucible seemingly perfect, when tapped or sounded, and the graphite hid all traces of manipulation. The fluxes reduced the oxide to metallic tin when the assay was made, yet the holes were too shallow to excite suspicion on breaking the crucible. It resulted, of course, in satisfactory assays, as long as these crucibles were used; and when assays were made elsewhere, the blank results were promptly explained away, with the help of the text-books, by the tin entering the slag from the use of improper crucibles. And thus did a few ounces of tin-oxide result in a generous exchange of cold cash, and taught some Missourians that a reliable expert is less costly than an untrained eye.

COAL IN SOUTH AFRICA.—The British South Africa Company reports that operations are now steadily proceeding in the Wankie coal-fields, in Rhodesia. The first colliery is now producing 1,225 tons per week. This colliery was opened only last October.

ELECTRIC HAULAGE IN METAL MINES.*

By W. N. CLARK.

The first electric mine locomotive was installed about thirteen years ago, and electric mine haulage is now in quite general use throughout the country in connection with coal mining. The rapid increase in the use of electricity for mine haulage is the best argument for the superiority of this system. It has materially cheapened the cost of production; from data compiled at various mines, the cost per ton of hauling coal is 50 to 75 per cent below mule-haulage, according to the situation of the mine, the grade of slope and the distance hauled.

Haulage by compressed air locomotives has been used to some extent, but there are several serious inconveniences connected with air. The pipe-lines and charging stations involve high first cost, and expensive maintenance; the frequency with which the locomotive must be charged interferes with regular operation, and the locomotive requires about one-half to one-third more vertical section of entry than an electric locomotive. The wheel base is often too great to turn the sharp curves frequently found in metal mines.

In mines where electric power is used, the same power that propels the locomotive may be used for various other mining operations, such as hoisting, pumping, drilling and ventilation. This advantage is important, because the superiority of electric transmission of power throughout a large mine over pipe-lines conveying steam or air has been demonstrated in several cases, and, if the same precaution is taken to have as high class apparatus and installation as in the ordinary steam equipment, the same reliability may be secured.

The trolley system of haulage has not been extensively used in metal mines. It is particularly adapted to long 'tunnel' systems through which is hauled the ore from a number of properties. The conditions of haulage in a metal mine are radically different from those found in coal mines. The passages in a coal mine require a locomotive built very low, but there is no such restriction as to width. The ordinary adit driven to tap metalliferous veins has ample height for any locomotive now on the market, but is usually restricted as to width. The common track gauge of 18 in. is extremely narrow.

The class of mine-cars required is also different from that employed in collieries. It is of advantage, and often necessary, to use a car which can be trammed direct to the dump and which can be hoisted on the ordinary cage. A car adapted to a smaller and narrower gauge must be used.

Mine locomotives are not rated by their horse-power capacity. The manufacturers usually rate them by their draw-bar pull and the speed which they will develop with this same pull or load on a level track in good condition. A locomotive will pull a maximum, with sand applied on the track, of about 25 per cent of its weight. The usual rating is from one-eighth to one-fifth of the weight on the drivers. The capacity is therefore determined by the weight and speed of the machine.

The horse power developed by the motor equipment will be:

$$\text{H. P.} = \frac{\text{Draw-bar pull} \times \text{miles per hour} \times 5{,}280}{33{,}000 \times 60} = \frac{\text{Draw-bar pull} \times \text{miles per hour}}{375} = \frac{\text{P. S.}}{375}$$

where P is draw-bar pull and S is speed in miles per hour.

It is evident from the above that the locomotive should be equipped with a motor, or motors, of sufficient capacity to take advantage of the full adhesive force of the drivers upon the rails. The length of the haul will also have an influence upon the capacity of the motors required. A motor that is required to pull its maximum load for a long period must be of greater capacity than one which pulls its maximum load at short intervals and is allowed to cool between these efforts. The capacity of an electric motor is determined by the load which it will pull for a certain length of time and not become dangerously heated by the current in its windings. Railway motors are usually rated in horse power at the load they will carry for one hour with a temperature rise in the windings not to exceed 75° C. In selecting a locomotive for long hauls the average draw-bar pull required should be well within the limits given by the manufacturers. With a short haul the full rated draw-bar pull may be taken as a basis for calculation.

The draw-bar pull required to move the cars both empty and loaded must be known in determining the capacity of the locomotive. The track resistance of the coefficient of friction of a car is usually given in pounds per ton required to move the car over a level track at a uniform rate of speed. For underground haulage, the track resistance may be taken as 30 lb.; that is, a pull of 30 lb. per ton of total weight will move the car over a level track at a uniform rate of speed. This coefficient 30 assumes a proper weight of rails and car-wheels in good condition. With a track of light rails, the coefficient will be much greater and the added expense of heavier rails as an investment will bring in large returns in savings on power and track maintenance.

The matter of grades is one of prime importance and an accurate profile of the roadbed should be made. In cases where there is a variation, it is more important to obtain the maximum grade since it is the maximum grade which will determine the size and capacity of the locomotive necessary to pull the given load. The extra resistance due to grades will be exactly 20 lb. per ton of weight for each per cent of grade. On a 2 per cent grade with the track resistance at 30 lb. per ton, the total resistance will be 70 lb. per ton of weight on the car-wheels. To this must be added the force necessary to propel the locomotive up the grade which will also amount to 20 lb. per ton. Hence, an eight-ton locomotive whose rated draw-bar pull is 3,000 lb. on a level track, will have on a 3 per cent grade, a net draw-bar pull of $3{,}000 - (8 \times 20 \times 3) = 2{,}520$ or $3{,}000 - (16{,}000 \times 0.03) = 2{,}520$.

A locomotive is able to propel itself up as steep a grade as 12 per cent, but in general practice in coal mining the maximum grades used in favor of the loaded trip and against the empties is 5 per cent for long hauls, and 8 per cent for short hauls. On the heavier grades, wire-rope haulage occupies a field distinctly its own.

Track curves should have as long a radius as possible, because the effect of a curve is to add to the track resistance. The track should also be well bonded, that is, all joints should be shunted with a copper bond. The rails should also be cross bonded at regular intervals.

A description of the haulage system used by the United Gold Mines Company, of Victor, Colorado, will be of interest. It was installed by the Woods Investment Company in 1901, and is the only electric mine-haulage system in use in the Cripple Creek district, having been in constant operation since the first day current was turned on.

The main adit is the Columbine Victor Tunnel which is driven from the Cold Coin mine to the mill of the Economic Gold Extraction Company through the center of Squaw mountain, a distance of 3,800 ft. A branch or cross-cut starts at a distance of 500 ft. from the entrance and is being driven north to the Wild Horse mine, a distance of 5,000 ft. through Bull hill. The roadbed is laid with 30-lb. rails having a gauge of 18 in., and any of the mine-cars can be hauled over the track. The car in general use is a little heavier and larger, and has better running gear than the average mine-car. The maximum grade is about 1 per cent in favor of the loaded trip. The track is well bonded, and is in good condition. An eight-ton locomotive is used with a draw-bar pull of about 3,500 lb., and a speed of 15 miles per hour. The machine is peculiar in being equipped with a single high-speed motor placed in the center and on the top of the frame, and the motor-shaft connects to the drivers by a chain of gearing. The brake is applied directly to the motor-shaft which gives the motorman an easy control of the locomotive. The machine was manufactured by the Morgan Electric Machine Company, of Chicago. The trolley is hung in the center of the track on substantial hangers, and is well in the clear, and has caused no inconvenience. A portion of the 'tunnel' is laid with double track, while at the Gold Coin shaft a switch chamber three tracks wide is provided.

The ore from the Gold Coin mine is all hoisted to the surface, and after sorting is dropped through chutes to the 'tunnel' level, a distance of 100 ft. The ore and waste from the chutes fall into the cars. Ore from the other properties bordering on the 'tunnel' is trammed to it and left on sidings until enough cars are filled to make a trip. Power is supplied to the trolley from the sub-station No. 1 of the Pikes Peak River Company, which is situated near the Gold Coin shaft-house. Power is charged for at the rate of material hauled. Careful watt-meter measurements were made to determine the average and maximum power used per ton of material hauled. The power used is generated by water power at Station A of the Pike's Peak Power Company, which was designed and built by R. M. Jones, engineer for the Woods Investment Company. Pelton wheels are used, operating under a hydraulic head of 1,150 ft. From station A, the current is transmitted a distance of twelve miles at a pressure of 13,000 volts, three phase, thirty cycle, to the sub-station No. 1 at Victor. Step-down transformers and rotary converters in the sub-stations deliver a 550 volt direct current to the trolley.

*To be read before the Technical and Engineering Society, State School of Mines, Colorado.

SILVER SHIPMENTS TO THE EAST.

From time immemorial, as our readers know, the East has been the great consumer of silver. Even in 1903, the shipments to the Far East, which can be directly traced, were about one-half of the total production of silver in the world; and in addition to this there were certain amounts shipped through German agencies, and through the Russian-Chinese Bank, the exact amount of which cannot be ascertained. It must be remembered that Japan has, for some years past, practically dropped out of the list of silver-buying countries. In 1903 the Chinese purchases, as shown below, fell off materially from the average of the past few years, and, in all probability, this decrease was only made up in part by the Russian and German shipments mentioned above. The great taker of silver last year was the British East Indies; and in this is included the Straits Settlements, to which shipments were unusually large, owing to the high price of tin which prevailed throughout the year.

The following table shows the shipments of silver to the Far East from London and from San Francisco. London still remains the chief market in which this silver is purchased. The estimated quantities given are based upon the values and calculated at the average price of silver in London and New York for the two years given:

From London:	1902.	1903.		Changes.
India	£7,074,970	£7,712,879	I.	£637,909
China	490,335	338,901	D.	151,434
Japan	46,500	.....	D.	46,500
Total value	£7,611,805	£8,051,780	I.	£439,975
Total ounces	75,833,700	78,077,900	I.	2,244,200
From San Francisco:				
China	$8,298,322	$2,218,721	D.	$6,079,601
Japan	21,950	.....	D.	21,950
Total value	$8,320,272	$2,218,721	D.	$6,101,551
Total ounces	15,951,400	4,151,000	D.	11,800,400

This statement shows an extraordinary decrease in the shipments from San Francisco to China. This has been made up only in part by shipments made by way of London, and it is fair to assume that China took comparatively little silver last year. The trade conditions were not favorable to such exports. The increased shipments to India reflect a period of good crops and large exports

The silver shipped from London to the East is largely produced or refined in this country. In 1903 fully 75 per cent of the silver imported into Great Britain was credited to the United States.

An unusual movement of silver was reported last year, which, in some degree, offset the exports noted. Ordinarily the receipts of silver from India in London are trifling in amount. Last year, however, their total value was £905,516. An explanation of this countermovement is difficult to find.

TENNESSEE PHOSPHATE TRADE.

Unlike Florida, which exports nearly all the high-grade phosphate rock mined, Tennessee sends abroad only about one-quarter. An explanation for this is that the Tennessee's rock (78 to 82 per cent) contains more iron and alumina—objectionable elements in the manufacture of high-grade superphosphates—than the Florida product. A disadvantage experienced by exporters of Tennessee rock is the high ocean freight, 12s. 3d. to 15s. 9d. ($2.94 to $3.78) from Pensacola, Fla., the usual shipping port, to Europe. This, coupled with more expensive operations at the mines, practically fixes the prices. During 1903 deliveries were made abroad at $8.58@$11.20 per ton, while the price at Mt. Pleasant, Tenn., fluctuated between $3.25 and $4.25, being somewhat better than in 1902. In all there were exported 113,948 tons, which, compared with 1902, shows an increase of 7,907 tons. Nearly 54 per cent, or 62,250 tons, went to Italy in 1903, while France received 23,049 tons; Belgium, 16,621 tons; Great Britain, 10,374 tons, and Germany, 1,654 tons. The leading shippers were the Tennessee Phosphate, the Central and the International Phosphate companies.

A LABORATORY ORE CRUSHER.

The accompanying illustrations show two views of the Case patent crusher for laboratory work, which has just been designed and

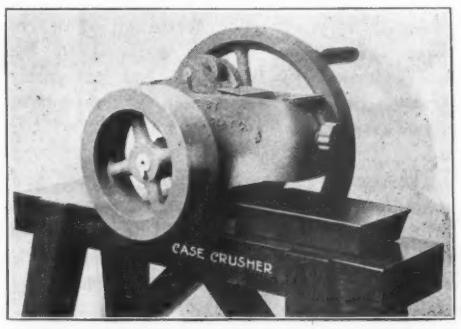

FIG. 1.

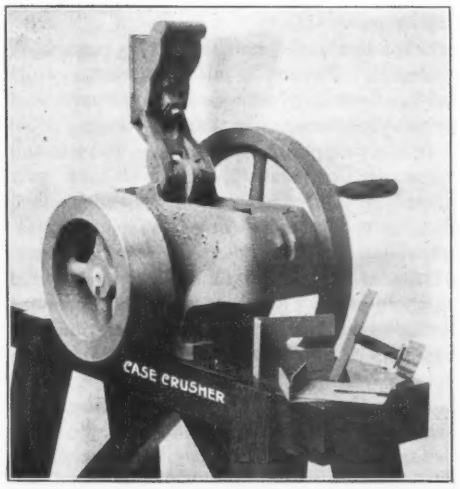

FIG. 2.—CASE LABORATORY ORE-CRUSHER.

brought out by the Denver Fire-clay Company. It is intended to supersede the Bosworth crusher made by the same company, being equal to that pattern and having several features not included in the Bosworth. The new type of crusher is designed to meet the demand for a power-driven machine, and for that reason the parts are made exceptionally strong, though it is a light-running machine. The special features of this crusher are the cleaning device and the adjustment. Fig. 1 shows the crusher ready for use, while Fig. 2 shows it open and ready to clean. All that is required to open it is two or three turns of the hand-wheel at the front end of the frame, which loosens the front jaw-plate and adjustment shims. The rear jaw and plate can then be raised and swung back, as shown. This cleaning device is quickly operated, does not in any way weaken the frame, or leave any loose parts to rattle and wear.

The adjustment for fine or coarse crushing is made by the use of steel shims, which are inserted between the front jaw-plate and the frame, the shim having a slot, shown in Fig. 2, allowing it to drop over the bolt connecting the jaw-plate with the hand-wheel. The adjustment varies from 0.25 in. to 30-mesh or finer. It can be quickly made, and does not alter the relative position of the front and back jaw-plates. The motion given to the movable jaw is such that it has a good feed, and will not cake on soft material. The rear jaw-plate is held by one taper-head bolt in the center, so that when the lower end becomes worn it can be reversed. The front plate is also reversible. When driven by power, the crusher is supplied with a belt pulley, 9 in. diameter and 2.75 in. face. The best speed for general use is from 450 to 500 revolutions per minute, and at this speed the machine requires about 1 h. p. to drive it. Under these conditions the crusher has a capacity of from 100 to 200 lb. per hour, according to the material. The jaw opening is 2.5 by 3 in. All parts are made in exact duplicates, so that they can be easily renewed. The weight of the machine is 135 lb., complete.

LAKE SUPERIOR IRON ORE SHIPMENTS.

In our issue for January 14 we published a statement of the shipments of iron ore from the Lake Superior region, estimating the quantity sent by rail. These rail shipments have now been made up, and the corrected statement is as follows, in long tons:

	1902.	1903.	Changes.
Escanaba	5,413,704	4,277,561	D. 1,136,143
Marquette	2,595,010	2,007,346	D. 597,664
Ashland	3,553,919	2,823,119	D. 730,800
Two Harbors	5,605,185	5,120,656	D. 484,529
Gladstone	92,375	85,816	D. 6,559
Superior	4,180,568	3,978,579	D. 201,989
Duluth	5,598,408	5,356,473	D. 241,935
Total by lake	27,039,169	23,649,550	D. 3,389,619
Total by rail	531,952	632,045	I. 100,093
Total shipments	27,571,121	24,281,595	D. 3,289,526

The rail shipments in December were larger than had been expected, bringing their total above that of last year. In this table, and in the following one, shipments from Canadian mines are not included.

The division of the shipments by ranges is as follows, in long tons:

Range:	1902.	1903.	Changes.
Marquette	3,853,010	3,040,245	D. 812,765
Menominee	4,627,524	3,741,284	D. 886,240
Gogebic	3,663,484	2,912,912	D. 750,572
Vermilion	2,084,263	1,676,699	D. 407,564
Mesabi	13,342,840	12,892,542	D. 450,298
Iron Ridge	.....	17,913	F. 17,913
Total	27,571,121	24,281,595	D. 3,289,526

The shipments from the Michipicoton range in Canada, not included above, were 203,419 tons. Of this ore 170,672 tons went to Lake Erie ports, making a total of 24,452,267 tons of ore sent to furnaces in the United States. As a matter of historical interest, we give below the shipments of Lake Superior ore from the first opening of the mines, at intervals of five years, illustrating the growth of the trade:

	Tons.		Tons.
1855	1,449	1885	2,466,642
1860	114,401	1890	9,003,725
1865	236,208	1895	10,429,037
1870	830,940	1900	19,059,393
1875	891,257	1902	27,571,121
1880	1,908,745	1903	24,281,595

The year 1902 was that of maximum production. The outputs of the individual mines were commented on in our issue for February 4 last.

RECENT LITERATURE OF ECONOMIC GEOLOGY. II.—Gold and Silver.

By F. L. RANSOME.

Progress Report on the Park City Mining District, Utah. By J. M. Boutwell. 'Contributions to Economic Geology 1902; *Bulletin* 213, United States Geological Survey, 1903, pp. 32-40.

Detailed study of the ore-deposits of this district were begun by the United States Geological Survey in 1902 and are still in progress. Park City is situated on the eastern slope of the Wasatch Range, about 25 miles southeast of Salt Lake City. Mining was begun in 1878, and, with the exception of a temporary depression in 1893, has shown a steadily increasing activity up to the present time. The Ontario mine, the first important discovery, is credited with producing over $33,000,000 in silver since 1883 and with the payment of over $13,752,500 in dividends since 1901. Other important mines now in active operation are the Silver King, Daly-West, and Daly-Judge.

The product of the Park City mines is chiefly silver, with minor amounts of lead, copper and gold, in approximately the proportion 9.1 gold to 2.6 lead, to 0.39 copper to 0.28 gold.

The sedimentary rocks of the district embrace: (1) limestones of unknown thickness, probably of Lower Carboniferous age; (2) 1,500 ft. of massive unfossiliferous quartzite, probably of Upper Carboniferous age; (3) 590 ft. of bluish limestone, probably also of Upper Carboniferous age; (4) 1,160 ft. of red shale and sandstone, 450 ft. of calcareous sandstone, 140 ft. of red shale, 630 ft. of limestone, calcareous sandstone and gray shale, and an unknown thickness of red shale, probably all of Mesozoic age. The sediments have a general northeast-southwest strike and dip northwest at an average angle of about 40°. They are cut by intrusions of diorite and diorite porphyry and locally overlain by andesitic or basaltic lava. The diorite intrusions occur as laccoliths and dikes within a belt which traverses the district in the direction of the strike of the beds and of the major fissuring. They have induced metamorphism in the adjacent limestones.

The unoxidized ores consist chiefly of galena and tetrahedrite, with more or less sphalerite and pyrite. Oxidation, which extends in places to a depth of 900 ft., has resulted in the formation of cerussite, anglesite, malachite and azurite. Both oxidized and sulphide ores are mined.

The Park City ores are not broadly disseminated through the rocks, but occur in large bodies, usually in the limestones and near the eruptive masses. Three types of occurrence are recognized, 'fissure ores,' 'replacement ores,' and 'contact ores.' In the first the ore carries either silver and lead, with or without sphalerite and tetrahedrite, or gold with some silver, and occurs between well-defined fissure walls. In the second, the ore carries chiefly silver and lead and occurs as elongated lenses in limestones, roughly parallel to the bedding. In the third, the ore carries copper and gold, with or without lead and silver, and occurs in irregular masses in metamorphosed limestone adjacent to bodies of diorite or diorite porphyry. Some of the highest gold values are found in fissures in quartzite.

Gold Deposits of the Kalgoorlie District. By P. Krusch, *Zeitschrift für praktische Geologie*, Vol. XI., 1903; pp. 321.

The Kalgoorlie district, or so-called 'Golden Mile,' lies on the east and southeast side of Kalgoorlie, which in the seven years since gold was discovered has grown to a town of 30,000 inhabitants, connected by rail with Perth on the West Australian coast. Water, formerly a luxury on this arid tableland, is now supplied from the neighborhood of Perth, at the rate of 5,000,000 gallons per day through a pipe line 325 miles in length.

The rocks of the Kalgoorlie district comprise amphibolitic and micaceous schists, peridotite and its derivatives, felsites, graphitic slates, quartzite, conglomerate, and superficial eolian deposits. The gold-bearing lodes strike generally northwest and southeast, and are mineralized zones of complex fissuring traversing massive and schistose amphibolites, mica schists and felsites. The lodes are not strictly parallel, but frequently branch into divergent zones of fissuring. The deposition of ore in these fissure-zones is not confined to the spaces formed by fracturing, but has partly replaced the rock between the fissures and to some extent the general wall-rock of the lodes.

The ores are distinguished as primary and secondary, the latter resulting from oxidation. In the primary ores the gold occurs partly free, partly in the pyrite and partly combined in the form of tellurides. Great nests of free gold and tellurides are not uncommon, but the normal ore consists of silicified rock of pure quartz minutely impregnated with auriferous pyrite, tellurides of gold and free gold.

The most abundant telluride is calaverite, which sometimes contains nearly 1.5 per cent of selenium. Petzite is also abundant, while krennerite and sylvanite are less common, and coloradoite, hessite and altaite are rare.

In the process of oxidation, the sulphur and tellurium are removed, although the part played by the oxidized tellurium and its final disposition are unknown. A notable peculiarity of the district is the absence of any zone of special enrichment immediately above the sulphide ores. There is merely a sharp undulating boundary between the oxidized and unoxidized ore. As a whole the oxidized ore contains less gold than the primary ore, and it is concluded that a part of the gold is carried away with the tellurium in the process of oxidation, and that in this respect the oxidation of telluride ores is markedly different from that of purely sulphide ores as exemplified in other districts.

An attempt is made to calculate the entire amount of gold concentrated in the 96 acres of the district to a depth of 1,000 ft. It is concluded that it amounts to about 139,000 tons. The proportion of gold to silver in the Kalgoorlie ores is about five to one.

A NEW METHOD OF CONVERTING PHOSPHATE ROCK.—The following method for the manufacture of fertilizers from crude phosphate rock is said to be in successful operation at Magdeburg, Germany. (*Moniteur Industriel*, January 16, 1904.) The rock is broken to coarse size and charged into a reverberatory furnace, together with 70 parts sodium bi-sulphate, 20 parts limestone, 22 parts sand and 7 parts coal. As soon as fusion takes place the material is tapped into a tank filled with water, which serves to granulate it. The material is then dried and ground, and placed in storage ready for the market.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Rhodesia Chamber of Mines. Annual Report for the year ended March 31, 1903. Bulawayo, Rhodesia; published by the Chamber. Pages, 112.

Geological Survey of Canada.. Mineral Resources of Canada. Asbestos. By R. W. Ells. Ottawa, Canada; Public printer. Pages, 28.

Register of Mines and Minerals of Mariposa County, California. Prepared under direction of Lewis E. Aubury, State Mineralogist. Pages, 16; with map. Price, 25 cents.

United States Geological Survey. Clays of the United States East of the Mississippi River. By Heinrich Ries. Washington, Government Printing Office. Pages, 300; illustrated.

West Virginia Geological Survey. Map of West Virginia. Scale Eight Miles to the Inch. Prepared under the direction of I. C. White, State Geologist. Morgantown, W. Va.; published by the Survey. Price, 50 cents.

Report of the Department of Mines of Nova Scotia, 1903. A. Drysdale, Commissioner of Mines and Works; Edwin Gilpin, Jr., Mine Inspector. Halifax, N. S.; Public Printers. Pages, 176; with maps.

The Journal of the Iron and Steel Institute. Volume LXIV. No. 2, 1903. Edited by Bennett H. Brough, Secretary. London, E. & F. N. Spon, Ltd. New York, Spon & Chamberlain. Pages, 820; illustrated.

Jaarboek van het Mijnwesen in Nederlandsch Oöst-Indie. Thirty-third year, 1903. Prepared by the Bureau of Mines. Batavia, Java; Government Printing Office. Pages, 220; with maps and plates.

The Electrolysis of Water. Processes and Applications. By Viktor Engelhardt. Translated by Joseph W. Richards. Easton, Pa.; the Chemical Publishing Company. Pages, 140; illustrated. Price, in paper, $1; cloth, $1.25.

BOOKS REVIEWED.

Das Roheisen unter Mitberücksichtigung seiner weiteren Verarbeitung. Part I. Vienna, 1903; published by the Ministry of Commerce of Austria. Pages, 280.

This is a statistical compilation relating to the production of pig iron and iron and steel manufactures in Austria-Hungary, Germany, Great Britain and the United States. It includes, also, tables showing imports, exports and consumption of iron in the countries named. The statistics cover a long term of years and are brought down to the close of 1901.

Factory Manager and Accountant. By Horace L. Arnold. New York and London; *The Engineering Magazine.* Pages, 432. Price, $5.

The book aims to set forth the latest and most approved methods of accounting for the factory. The subject is handled in an eminently practical manner, and the information is so

detailed that the reader can easily comprehend its application to his own particular needs. Complete sets of factory-accounting forms for various lines of business are accurately reproduced as to form, size, color and arrangement, with instructions regarding their functions and exact employment. The importance of well-devised commercial and accounting systems in modern manufacturing is being more widely recognized every year, and we have no doubt that the present volume will prove serviceable in extending their use.

Geological Survey of Michigan—The Delta of the St. Clair River. By Leon J. Cole. Lansing, 1903; State printer. Pages, 25; with maps and illustrations.

The present paper is a geological study of the delta formation at the mouth of the St. Clair river. The author calls attention to the fact that the formation of a delta deposit in this locality is something of an anomaly, in that it is formed by a river which serves as the outlet of a great lake, and which for this reason should be comparatively free of sediment. As a result of his study, he concludes that the materials from which the deposit is being built up are derived, for the most part, by the action of waves on the shores of Lake Huron. The paper is written in a clear style, and presents many facts of interest from a purely scientific standpoint.

Chemical Technology, or Chemistry in its Applications to Arts and Manufactures. Volume IV. Electric Lighting. By A. G. Cooke. *Photometry.* By W. J. Dibdin. Philadelphia, 1903; P. Blakiston's Son & Company. Pages, 378; illustrated. Price, $3.50.

The volumes on chemical technology originally edited by Grove and Thorpe have long been recognized as the standard work of reference in this field, and have formed the basis of many later works on the various technical applications of chemistry. The editors of this volume have given due recognition to the assistance received from the older work, although, naturally, much of the material has had to be revised, or entirely rewritten. It may be said that they have succeeded in making a satisfactory and up-to-date book, giving a scientific account of the whole subject, which may be consulted with confidence by the general reader and the specialist.

The *Electric Club Journal* is a new monthly publication, issued by the Electric Club, of Pittsburg, at a subscription price of $1 yearly. No. 1, for February, 1904, has an attractive appearance, and contains some excellent articles. The purposes of this periodical are best explained by the following statement from the editors: "The Electric Club is composed of Westinghouse men and the papers read before it are largely by Westinghouse men; it follows that a majority of the articles printed by the *Electric Club Journal* will be written about Westinghouse methods and apparatus, by men who are responsible for Westinghouse practice. These articles, written for young men from a strictly engineering standpoint, will be all the more valuable because they are definite and relate to specific apparatus and methods, and are not abstract and indefinite. The better knowledge which may be disseminated regarding Westinghouse men and methods will be appreciated by many who are not now familiar with them. The advantage which the Electric Company will derive incidentally from the publicity given to its engineering practice will not lessen the value to the engineering public of the material we print. Our purpose is definite: to publish a journal for young engineers, containing material suited to their needs, and written in a form to meet their education and experience. To what extent we accomplish this purpose, the *Journal* itself will determine."

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Texas Oils.

Sir: Permit me to offer some observations on the letter of Mr. James Spicer, Kerrville, Texas, as published in your issue of February 4, page 208. Mr. Spicer says: "Our State geologist says he has never seen such oils; he is now satisfied as to their natural origin." As I have the honor of presiding over the only mineral or geological survey in this State, I suppose that Mr. Spicer refers to me. I have had a good deal of correspondence with Mr. Spicer during the last two years, and he sent me samples of the oils to which he refers. I have not visited the locality and know nothing whatever about it from personal observation. After examining the samples received from Mr. Spicer I expressed my doubts of their natural origin. I wrote to Mr. Spicer that if these oils were of natural origin we would have to change our views of such matters radically. I dislike to enter into a controversy of this kind, and had I not been referred to so pointedly I would have remained silent. But I may say that I am not now, nor have I ever been, satisfied that these oils are of natural origin.

WM. B. PHILLIPS.

Austin, Tex., Feb. 12, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

National Lead Company.

The report of this company, which owns large white lead factories and other manufacturing plants, covers the year 1903. The capital stock is $15,000,000 preferred and $15,000,000 common. Of this, $96,000 preferred and $94,600 common stock are held in the company's treasury.

The report says: "The aggregate tonnage was slightly increased over 1902, and our capacity was heavily taxed during the busy season; the later months were not so active as in the previous year. The net earnings of $1,569,069 show a gratifying increase over preceding years, and, after paying dividends of $1,043,280, enable us to add $525,789 to surplus account, which now shows a credit balance of $1,962,831, and is actively employed in the business. A large surplus account is required for adequate working capital, and is also a provision against possible shrinkage in the value of the large stocks necessarily carried. During the period under review $132,569 was expended for ordinary repairs and $220,905 for new improvements, making an aggregate of $353,474, all of which was charged to operating expense. While the value of inventory is on a lower basis than last year, stock on hand shows an increase of $271,869, due to the necessity of carrying larger stocks to supply increasing demands.

"During the year we bought a prominent white lead plant and business, to meet the increased demand and supplement existing properties. Plans have been approved for additional construction in other departments, which will be hastened to completion. Generally, the business may be said to be in a prosperous condition, and the properties in the best of order."

Pittsburg Coal Company.

This company was originally formed by the consolidation of a number of mines in the Pittsburg district; and has since acquired other properties in Pennsylvania and Ohio, as shown below. Its report covers the calendar year 1903.

The company's capital stock is $30,716,200 preferred and $30,135,000 common. It has outstanding $2,434,448 in land mortgages; $2,003,133 in bonds of subsidiary companies; $5,400,000 in collateral bonds; a total of $9,837,581. There are also other current obligations, which are referred to below.

The production of coal from the mines operated was as follows, in short tons:

	1902.	1903.	Changes.
Pittsburg District	13,526,355	14,034,268	I. 507,913
Hocking District	1,381,996	1,480,350	I. 98,354
Coke District	67,730	149,842	I. 82,112
Totals	14,976,081	15,664,460	I. 688,379

The income account for the year is as follows, the net earnings showing the profits after deducting all working and general expenses:

Net earnings	$7,787,095
Royalty account	$634,457
Depreciation fund	401,614
Total charges	$1,036,071
Balance	$6,751,024
Dividends on preferred stock and interest on bonds	2,440,088
Undivided profits	$4,310,936
Balance from 1902	5,467,494
Total undivided earnings	$9,778,430

The royalty account represents a charge on earnings made for all coal mined, at the rate of $400 per acre of coal mined out.

The net balance given above for 1903 compares with $4,706,587 in 1902, and $3,099,538 in 1901.

The principal new investments during the year 1903 were as follows: Purchase of 11,390 acres of coal and 1,197 acres of surface lands in the Pittsburg district. Purchase of 3,813 acres of coal and 1,344 acres of surface lands in the Hocking district of Ohio. Purchase of 50,000 shares preferred and 300,000 shares common stock of the Monongahela River Consolidated Coal & Coke Company, being a controlling interest in the property. Purchase of entire capital stock of the Mansfield Coal & Coke Company. Constructing 270 coke ovens, power plant, steel tipple and reservoir for water supply and equipment to complete the plant of the Colonial Coke Company. Build-

ing 238 standard 40-ton railway cars and 2,110 mine cars—all built at the Montour shops of this company. Erecting 614 miners' houses. Opening up and equipping Banning No. 2 mine, on the Youghiogheny division of the Pittsburg & Lake Erie. Opening up and equipping Idlewood mine, on the line of the Pittsburg, Cincinnati, Chicago & St. Louis. Completing development and equipment of the Midland mines, on the Chartiers Valley. Constructing No. 2 dock of Western Coal & Dock Company at Waukegan, Ill. Enlarging and renewing dock of Ohio Coal Company at Duluth, Minn.

The report of President Francis L. Robbins says: "The increase in net earnings is due to advantages accruing from the acquisition during the past four years of coal, mine, dock and other properties which have increased the production and facilitated the marketing of the company's output, together with the general favorable business conditions, which, however, were adversely affected by the general congestion of railroad traffic and consequent insufficient means of transportation. The company at its organization had about 80,000 acres of coal in fee and 2,700 acres under lease, located in disconnected properties, equipped with machinery and appliances to a great degree long out of date, costly and inefficient of operation, and practically no coal handling and dock facilities. During the four years of its operation, additional coal lands, equipment, transportation, dock and other properties have been purchased to protect its property as a whole and to make it connected, efficient, economical and altogether modern, so far as the production and marketing of its products are concerned. In acquiring the new properties and modern equipment for these purposes, resulting in the annual increase of the net earnings noted above, about $40,000,000 have been expended, of which $14,268,975 have been paid from the company's surplus earnings and reserve funds, the balance being represented by short term bonds, purchase money mortgages and bills, payable outstanding, as shown in the balance sheet. . . . .

"The property of the company to-day consists of all the coal acreage, properties, railways, docks, cars, etc., that it possessed at the date of its organization, less diminution by reasonable wear and tear and mining operations of the company, but improved and modernized as to its equipment, together with the properties acquired since organization, for which the aggregate expenditure was $39,800,000, which has in part been paid by surplus earnings and reserve funds, leaving a balance of $25,694,618 unpaid at this time. Of this amount, however, $4,137,056 is current accounts payable and represents less than the average expenditures of the allied companies for one month, the means to pay which and leave a balance of $8,471,523 of working capital is supplied by the quick assets of the company, amounting on December 31, 1903, to $12,608,579. It will be seen, therefore, that the proceeds from the proposed sale of bonds, which is now submitted to the stockholders, will fund all the company's purchases that have not been paid for out of earnings, and leave a working capital of about $6,000,000—the original working capital of the company having been only $2,500,000.

"The items in the balance sheet under the head of liabilities, which represent this unpaid balance of $25.694,618, are as follows:

Collateral bonds	$5,400,000
Deferred payments Monongahela River C. & C. common stock	4,500,000
Bonds of subsidiary corporations	2,003,133
Mortgages	2,434,448
Car trust notes	154,141
Bills payable	7,065,840
Accounts payable	4,137,056
Total	$25,694,618

"The cost of these properties, as above enumerated, has been caried as commercial paper, short term bonds or mortgages, until the plant could be considered such a completed property as to most economically produce and market the output of the company. This was accomplished during the past year. It is the cost of these recently acquired properties that the board now recommends shall be funded into long-term bonds, secured by a mortgage upon the property of the company, namely, 5 per cent 50-year bonds, secured by first mortgage, which, subject to the approval of the stockholders, have been sold to the Union Trust Company of Pittsburg. Plans for the funding of this debt were formulated early in the year, and one, in which the railroad companies operating in the Pittsburg district were to be factors, was practically completed, when, owing to the development of a legal difficulty, it was found impossible to carry the plan to completion. Other negotiations were at once commenced, but, owing to the changing financial conditions, were not consummated, when finally the arrangement was made with the Union Trust Company, to which reference has been made.

"In connection with the purchases referred to, your officers would state that, in their opinion, your property is now complete in respect to its ability to produce the tonnage equal to all requirements, and through its docks at all of the principal ports on the Great Lakes has now adequate means for the distribution of its production so that no further extraordinary expenditures of any kind will be necessary for many years.

"The wisdom and desirability of operating the properties of the Pittsburg Coal Company and the Monongahela River Consolidated Coal & Coke Company under a single management has long been apparent, and on November 1 a controlling interest in the Monongahela River Company was acquired through purchase of a majority of its stock.

"In the last annual report, attention was called to the operations of the Pittsburg Coal Company Employees' Association, under which employees are enabled to purchase preferred stock of the company; to secure for themselves and their families benefits in cases of accidents or death, and are assured pensions under prescribed conditions. The number of employees who are taking advantage of this opportunity to purchase stock has grown from 1,040 to 1,571 during the year just closed, and the number of shares of stock thus being acquired has increased from 7,723 to 11,215. There has been distributed in accident and death benefits during the year upward of $60,000, and the pension fund has grown to $23,601. Your officers' expectations of great mutual benefits through the working of the Employees' Association are being fully realized.

"Other purchases of property and equipment are summarized in the report. The result of these expenditures has been to so perfect the means of production and distribution as to reduce the operating expenses and contribute largely to the company's earnings for the year just closed. It is confidently expected that the costs of operation at both mines and docks will be further substantially reduced by the improvements here referred to. Another factor in cheapening the cost of production has been the policy of connecting up small and comparatively unprofitable mines with larger workings, thus economizing in power, supervision and the general use of equipment."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Leaching Copper Ores.—Can you tell me anything of the Von Gernet process of leaching copper ores? When was it patented?—J. T. M.

Answer.—The process you refer to is covered by United States patent No. 717,565, dated January 6, 1903, issued to Adolph Von Gernet. It consists practically, as described in the patent, in slowly passing the ore, in the form of pulp, through a current of sulphurous acid passed in a direction opposite to that of the travel of the ore, or pulp.

Barium.—In what form is barium found in nature, and where are the chief sources of supply? Can you give me information also in regard to the uses, value and principal buyers of the crude material?—M. F. R.

Answer.—Barium forms two compounds of economic value—barium sulphate or barite and barium carbonate or witherite. Barite is much the more important mineral, and is mined quite extensively in the United States and other countries. Virginia, North Carolina, Tennessee and Missouri supply most of the mineral consumed in this country. Barite is used largely in the manufacture of various salts which find application in the manufacture of sugar and in chemical laboratories. The mineral is also ground and used as an adulterant of paints and other materials and for the manufacture of lithophone. The crude barite is worth from $3 to $4 per ton at the mine. Among the dealers in barite are Gabriel & Schall and Hammill & Gillespie, of New York.

Relative Heat Values of Coke.—In two different samples of coke the ash is 12 and 17 per cent, respectively; assuming the rest to be carbon, how much more of the 17 per cent ash coke would be required to do the same amount of work than the coke containing 12 per cent ash?—E. P. R.

Answer.—The question, as you state it, involves only a simple mathematical ratio between the efficiencies of the two kinds of coke. As the one variety contains 88 per cent of carbon and the other 83 per cent carbon, or heating value, their relative efficiency would be as 88 is to 83; or, in other words, the former possesses greater efficiency by 5 than the latter. To obtain this additional efficiency with the lower grade material would require the use of $5 \div 83$, or, approximately, 6 per cent more coke.

While this method of calculation may be used in estimating the relative efficiencies of different grades of coke, the results obtained are only approximate, as much depends upon the quantity of water and the proportion between carbon and other components. With coal the error would be still larger, owing to the greater variations in composition.

Phosphorus.—Is phosphorus manufactured in this country at present, and if so, by whom? What crude materials, other than bone-ash, are used for this purpose? What books would you recommend as the best authorities on the subject?—C. G. S.

Answer.—There are several plants in the United States for the manufacture of phosphorus; some of them are owned by the General Chemical Company and the United Alkali Company. High-grade phosphate rock, containing 70 per cent or more of lime phosphate, is used extensively in the place of bone-ash. The manufacture of phosphorus is described in 'The Mineral Industry,' Volumes II and VIII.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON ARTIFICIAL CRYOLITE.—Artificial cryolite is entitled to free entry as "cryolite or kryolith" under the provisions of paragraph 538 (free list) of the tariff act of July 24, 1897.—Appeal of Vollrath Manufacturing Company from Collector of Customs at Milwaukee; Board of General Appraisers.

DUTY ON CHALK.—Precipitated chalk, imported in the condition in which it is taken from the mines, except that it has been once bolted, and which is not manufactured, being intended for use in making tooth powder, is dutiable at 25 per cent ad valorem under the provision for "manufactures of chalk" in paragraph 13, tariff act of July 24, 1897.—Appeal of C. M. Taylor's Sons from Collector of Customs at Philadelphia; Board of General Appraisers.

DUTY ON RUTILE.—Certain so-called rutile was classified under paragraph 183 of the tariff act of 1897 as a metallic mineral substance in a crude state, and was claimed to be free of duty under paragraph 614 as a crude mineral substance. The chemical analysis showed it to consist of "native impure titanic oxide, not a metal." Protest sustained.—Appeal of Foote Mineral Company from Collector of Customs at New York; Board of General Appraisers.

MINING AND SURFACE RIGHTS.—The owner of a mine beneath the surface, though he has a right of way through the surface soil, has no right to exercise the same so as to interfere with the power of the owner of the surface land to make any lawful use thereof. . . .

He is not liable for any incidental damage necessarily occasioned by the ordinary and careful operation of the mine. . . .

The miner is authorized to use such means and processes for the purpose of mining and removing the minerals as may be reasonably necessary, in the light of modern invention, and of the improvements in the arts and sciences.—Lindley's 'Mines and Mineral Lands,' Section 814.

DUTY ON STONE SWEEPINGS.—Caen stone in small fragments, being the sweepings of a stone or marble yard, is free of duty under paragraph 614, tariff act of 1897, as a crude mineral not advanced in value or condition by refining or grinding, or by other process of manufacture.—Appeal of Alavoine & Co. from Collector of Customs at New York; Board of General Appraisers.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 16, 1904.

752,027. ORE-SEPARATOR.—Henry J. Burroughs, Los Angeles, Cal. A separator comprising a main frame, a two-part separating-tank therefor, means for adjusting one portion of said separating-tank vertically relative to the other, a feeder for said tank, and means for revolving the feeder, substantially as set forth.

752,044. REDUCING AND SEPARATING MACHINE.—Enoch B. Craven, Asbestos, Ga. A device comprising a pair of reduction-mills, a separator having compartments connected with the said mills and subcompartments provided with discharge-valves, partitions within the compartments, movable deflectors at the upper ends of said partitions, stationary deflectors in the upper part of the separator-chambers, means for inducing air-currents through the separator-chambers and through fan-casings, dust-collectors receiving the air-currents and the particles suspended therein from the fan-casings, and means for returning the air-currents from the upper ends of the dust-collectors to the reduction-mills.

752,054. PROCESS OF TREATING IRON AND STEEL.—Ewald Engels, Düsseldorf, Germany. The process that consists in treating iron or steel in a solid state with solid carbide and an agent that decomposes such carbide and causing a reaction by means of heat, for substantially the purposes set forth.

752,064. ART AND PROCESS OF CONSOLIDATING PEAT.—James O. Green and Harry T. Martin, Whitewater, Wis. The art or process of consolidating peat fuel by grinding dry peat into a fine powder until the fiber is destroyed, and then reducing the dry peat-powder to a solid mass by hammering or pounding with sufficient rapidity to product heat enough by the impact to release the tar in the peat for the purpose of binding the whole together.

752,073. BRICK-MACHINE.—Charles H. Horton, Painesville, Ohio. In a brick-machine, the combination with a casing having a recessed front portion, of a vertical shaft in the casing carrying stirrers and wipers, a plunger located within the front portion of the pug-mill casing and inclosed thereby, a crank-shaft at the top of the casing, a yoke carrying the plunger and having a guide located in the recess in the casing, a box mounted to slide in the guide, a pitman connecting the box and crank-shaft, and a plate to be inserted in any of a series of grooves in the guide to limit the sliding movement of the box.

752,098. HYDRAULIC ENGINE AND PUMP.—Charles H. Pagett, Lafayette, Ind. In a pumping device, the combination of the pump-cylinder and the motor-cylinder, a reciprocating piston-rod, pistons disposed in the two cylinders and each comprising a pair of plates of which one is provided with a grooved and threaded stem and the other with a threaded opening and screwing on said stem, a tappet-plate interlocking with the grooved portion of each of the stems and serving to prevent the separation of the plates, means for securing the piston-rod to the tappet-plates, a valve, and a tappet-rod connected to the valve and adapted to be engaged by the tappet-plates.

752,138. ORE-MILL.—William E. Wild, Denver, Colo. In an ore-mill, a roll-support, comprising a central hub having wings which extend tangentially therefrom, and which are recessed to form guideways, the bottoms of which incline downwardly toward the hubs, and are apertured adjacent thereto, while their sides have vertical grooves formed therein; bearing-blocks located in the guideways, each having a horizontal bore, tongues which fit in the vertical grooves, and oil-holes, one of which extends through the top of the block into the bore, while the other extends from the bore through the bottom of the block and communicates with the guideway of the support; rolls having shafts which are journaled in the bore of the block, the said rolls having shoes with two grinding-faces at an angle to each other, in combination with a chamber having a central bore which is surrounded by an oil-cup, an annular die having faces which coincide with the faces of the rolls, and a shaft extending through the said bore, to which the support is keyed, and means for revolving the shaft and support.

752,165. CONTACT APPARATUS FOR THE PRODUCTION OF SULPHURIC ANHYDRIDE.—Wilhelm Hasenbach, Mannheim, Germany, assignor to Verein Chemischer Fabriken in Mannheim. A contact element for the production of anhydrous sulphuric acid, consisting of a pair of supporting-frames, a plurality of sheets of platinized fabric, and wire-netting arranged between adjacent sheets of platinized fabric, said fabric and netting being clamped between and supported by said frames.

752,180. MINING-MACHINE.—Edward P. Rauscher, Columbus, Ohio. In a mining-machine of the pick type, the combination of a frame, a socket-bearing supported in the frame, a ball universally movable in the socket-bearing, a pick-stock passing through and reciprocable in said ball, and means for mechanically rotating the pick-stock.

752,208. WELDING APPARATUS.—Hugo Dicke, Frankfort-on-the-Main, Germany, assignor to Jacob Eduard Goldschmid, Frankfort-on-the-Main, Germany. In an apparatus for locally heating metals for welding purposes, the combination of an upper burner, a lower burner, air and gas pipes forming a portable forked structure or yoke connected to and supporting each of said burners, means for adjusting the burners with respect to each other, and means for freely suspending said yoke.

752,209. WELDING APPARATUS.—Hugo Dicke, Frankfort-on-the-Main, Germany, assigner to Jacob Eduard Goldschmid, Frankfort-on-the-Main, Germany. In an apparatus for welding tubes and the like, the combination with a heating device, of an anvil and an automatic hammer located adjacent to said heating device, means to automatically feed successive portions of the work to the heating device and between the anvil and hammer and mechanism co-operating with said feeding means to subsequently move the work into contact with the anvil.

752,218. FORGING-SUSPENDER.—Edwin F. Galloway, Jr., Newark, N. J., assignor to Empire Engine and Motor Co., Orangeburg, N. Y. The combination of a forging-suspender, a turnbuckle connected in the suspender, a motor and geared connections between the motor and the turnbuckle.

752,246. AMALGAMATOR.—Peter J. Nelson, Baltimore, Md., assignor to the Baltimore Amalgamator Co., of Baltimore, Md. An amalgamator, comprising a tank provided with a mercury-chamber; a partition secured in said tank and forming therein a feed-passage for the slime and the like to the mercury-chamber, said partition being provided in its lower edge with recesses and revoluble beaters, arranged to sweep through said recesses into both the feed-passage and the mercury-chamber.

752,247. FLOATING PULSOMETER-DREDGE.—Edwin A Newman, Washington, D. C. A floating pulsometer-dredge comprising a hull constructed with a central well and an opening extending forward through the bow, both of which are open at bottom, one or more pulsometers mounted within said well and having working chambers which are periodically immersed in the water filling the bottom of said well, to condense the steam, a rotary ingathering head, and a connecting pipe or pipes hinged within said well and lowered from within said opening to its working position.

752,248. CRANE.—Ernest Nickerson, Newton, Mass. A crane having a boom for supporting the load carried thereby, the foot of which boom is adapted to have movement when draft is imparted to the boom by the weight of the load, a counter-balancing-weight and means whereby the weight of the load through the instrumentality of said boom-foot, thus movable, may move the counterbalancing-weight.

752,265. LATCH FOR MINE-CAR DOORS.—Christian H. Smith, Trauger, Pa. The combination with a door, of a latch-bar arranged for rotation on said door and having a lateral projection, a keeper adapted for engagement by said lateral projection, a lever on said latch-bar, and means mounted on the door for engagement by said lever to hold the latch in operative position.

752,286. PROCESS OF FRACTIONING BROMINE APART FROM CHLORINE.—Herbert H. Dow, Midland, Mich., assigner to the Dow Chemical Company, Midland, Mich. The steps in the process of fractioning bromine apart from chlorine, which consist in oxidizing bromide-containing brine, in blowing out the purest bromine thus set free, by a limited amount of air, then blowing out the remainder of the bromine without further oxidation by a large amount of air, and recovering both portions of bromine thus blown out by suitable absorbents.

752,289. SIDE AND CENTER DUMP COKE-CAR.—John M. Hansen, Pittsburg, Pa. The combination of a center sill and car sides, a pair of longitudinally-arranged doors on each side of the center sill arranged to open in opposite directions, mechanism common to the inner doors on the two sides of the car for opening and closing the same, and independent mechanism for opening and closing the outer doors on the two sides of the car.

752,310. DOOR-OPERATING DEVICE FOR HOPPER CARS.—Arnold Stucki, Allegheny, Pa., assignor to Standard Steel Car Company, Pittsburg, Pa. In a door for cars and the like, the combination with a door, of hinges therefor arranged to permit movement of the door transversely to its axis, and guiding-links connected to said door and arranged to cause the same to move in a somewhat parallel plane.

752,311. METALLIC CAR.—Arnold Stucki, Allegheny, Pa., assignor to Standard Car Company, Pittsburg, Pa. In a car, the combination of the body provided with plate-girder combined sides and side sills, a floor, transverse floor-supports, and vertical stiffening members secured to the car sides and provided with a portion extending outwardly from the car sides and having their lower ends bent inwardly and secured to the floor-supports.

752,320. EXTRACTION OF METALS FROM COMPLEX ORES.—José Baxeres de Alzugaray, Bromley, England. In the treatment of complex ores, such, for instance, as contain copper, lead, silver and zinc in comparatively large quantities, the process of extracting the said metals selectively which consists in leaching the ore with a solution composed of a mixture of a chloride of an alkali or earth-alkali metal with a chloride of a metal other than those of the alkali or earth-alkali series and an acid before calcination or roasting whereby the copper is obtained in solution, then washing and drying the ore, roasting the partially-disintegrated ore at a low temperature, extracting the metals from the roasted ore in form of salts by means of a second and weaker leaching solution having a character consonant with the nature of the salt it is desired to obtain, and recovering the metals in the usual way.

752,231. PROCESS OF FRACTIONING BROMINE FROM CHLORINE.—Herbert H. Dow, Midland, Mich., assignor to the Dow Chemical Company, Midland, Mich. The steps in the process of fractioning bromine apart from chlorine which consist, in oxidizing bromide-containing brine to excess of its bromine content before removing any of the bromine, obtaining substantially pure bromine by passing through the oxidized brine a limited amount of air, and then recovering the bromine from the bromine-laden air in a suitable absorbent.

752,332. PROCESS OF MANUFACTURING BROMINE FROM NATURAL BRINE.—Herbert H. Dow, Midland, Mich., assignor to the Dow Chemical Company, Midland, Mich. The steps in the process of manufacturing bromide from natural brines which consist, in oxidizing the brine, then obtaining bromine of a graduated degree of purity by successively passing through the oxidized brine limited amounts of air, and successively recovering in suitable absorbents from the bromine-laden air the different grades of bromine thus carried off.

752,349. BATTERY STEM-GUIDE.—William H. Martin, Nevada City, and Alexander McCombie, Grass Valley, Cal. A battery-guide, comprising a metallic block having upon opposite sides of its stem-space downwardly-converging guides, and a cap having lateral flanges, the edges of which converge downwardly and are adapted to engage said guides.

752,357. PROCESS OF ELECTRICALLY HEATING ARTICLES.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity, but is converted into a better conductor by heat, arranging the articles to be heated in proximity both to said conductor and layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles.

752,358. PROCESS OF HEATING ARTICLES BY ELECTRICITY.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. The process of electrically heating articles, which consists in arranging the articles in proximity to a resistance-conductor, passing an electric current through the conductor and thereby partially heating the articles, and then mechanically directing electric current through the article and thus heating them to the desired temperature.

752,411. MANUFACTURE OF SHEET METAL.—Alexander Paterson, Wilkinsburg, Pa. A method of making sheet metal, consisting in heating a pack of sheets in a heating-furnace to a rolling temperature, transferring the pack while hot to a second heating-furnace, in which the pack is maintained at a rolling temperature, and removing the same therefrom for rolling.

752,438. MUFFLE.—John Carter and Alfred G. Carter, Malden, Mass. In a muffle, the combination of a hollow member, a cylinder mounted therein and connected thereto, a central flue connected with said cylinder and passing through the same, a dome covering said cylinder and said flue, said dome being provided with an aperture, a member for closing said aperture, and mechanism connected with said member and extending without said hollow member for the purpose of enabling the same to be operated from a point external to the muffle.

752,441. CONVEYOR.—James G. Delaney, New York, N. Y. In a conveyor, the combination with a trackway, a carriage adapted to travel on said trackway, a traction-rope connected with the carriage, an overhauling-rope, and a hoisting-rope extending between the carriage and one end of the trackway, of a two-part sheave on the carriage adapted to receive wraps of both overhauling and hoisting ropes, one on each part.

752,442. HOISTING AND CONVEYING DEVICE.—James G. Delaney, New York, N. Y. A hoisting device comprising a chain hoist-wheel, a chain storage-wheel driven in unison therewith, and driving means for said chain-wheels adapted to be operated by a passing rope.

752,462. TAPPET FOR STAMP-MILLS.—Edward I. Morey, Telluride, Colo. A tappet comprising a sleeve adapted to receive a stem or shaft, and tapered locking-gibs movable in and longitudinally of the sleeve, the tapers being in opposite directions, and the said gibs being spaced apart circumferentially of the sleeve.

752,483. ROPE SYSTEM FOR COAL-BRIDGE HOISTS.—George E. Titcomb, Philadelphia, Pa., assignor to the Dodge Coal Storage Company, Philadelphia, Pa. The combination in a supporting structure, of a trolley carried thereby, a bucket, a cable having both its ends attached to the bucket and passing around sheaves on the trolley and supporting structure, and having a looped portion, a hoisting-sheave in the loop of the said cable, and a hoisting-rope for operating the sheave so as to raise and lower the bucket.

752,490. MINING DRILL FOR COAL OR ROCK.—Alexander Walker, What Cheer, Iowa, assignor to What Cheer Drill & Miners Tool Company. A multipart boxing internally threaded, at least one section of the boxing having a recess intersecting the threaded surface thereof to receive a lubricant.

752,504. STONE-SAWING MACHINE.—Oscar W. Alston, Lanesboro, Pa. In a stone-sawing machine, the combination of a bracket carrying saws, of a rockably-mounted saddle, a pair of converging pendulums pivoted at their lower ends to said bracket and at their upper ends to the arms of said saddle, the point of intersection of the lines of direction of said pendulums lying in said lines produced.

752,555. GATE AND CHUTE FOR COAL OR ORE POCKETS.—George L. Holmes, Chicago, Ill. In a gate and chute for coal or ore pockets, the combination of a gate to cut off the flow of coal with a transverse rod below the bottom of the discharge-way, said gate pivoted on such rod, and an outer spout pivoted concentric with but on pivots independent of the rod.

752,565. BRIQUETTING-MACHINE.—William A. Köneman, Chicago, Ill. In a briquetting-machine, the combination with companion traveling belts provided respectively with molds and mold-covers, plungers in the molds, and means for feeding material to the molds, of an inclined-plane support across which the plungers move to effect the compression, and means for adjusting the said support with reference to the path of the mold-carrying belt.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 31, 1904.

28,256 of 1902. MAKING SLAG CEMENT.—H. Passow, Hamburg, Germany. Method of making cement from blast-furnace slag by rapidly disintegrating the molten slag into powder and then slowly cooling the powder.

1,309 of 1903. SEPARATING GRAPHITE.—C. Kendall, London. A method of separating graphite from gangue by immersing the crude mineral in a mixture of water and then paraffin or kerosene, the graphite thereupon floating with the kerosene while the gangue falls to the bottom.

4,504 of 1903. REMOVING MINE TIMBERS.—E. Bonsall and J. Barnes, Mansfield. Improved chain and pulley block for removing props from mines.

4,618 of 1903. LIGHTING MINERS' LAMPS.—W. Best, Morley. Improvements in the inventor's apparatus for electrically igniting miners' oil lamps.

7,027 of 1903. ELECTRIC REFINING OF IRON.—Société Electro-Metallurgique Francaise, Froges, France. In the electric refining of iron, first bessemerizing the pig iron to reduce the impurities, especially phosphorus, and then transferring the metal to an electric furnace, where the metal is kept hot while the necessary elements are added.

8,101 of 1903. STEEL MAKING.—T. E. Young, Canton, Ohio, U. S. A. In steel making projecting the blast along the surface of the molten metal, so that the slag is blown away directly it rises and the metal itself is revolved as in the puddling process.

8,136 of 1903. MINE CAR COUPLING.—J. Evans, Cardiff. Improved safety devices to prevent the accidental uncoupling of colliery trains.

10,814 of 1903. CHARGING ACCUMULATORS.—O. Mallet and A. Parent, Lille, France. Improved method of charging accumulators used with miners' electric lamps.

15,702 of 1903. MAKING WHITE LEAD.—J. H. Montgomery, St. Louis, U. S. A. In the manufacture of white lead, apparatus for spraying molten lead into a chamber where it meets jets of water which comminute it and oxidize it.

23,746 of 1903. IRON ORE BRIQUETTES.—G. Grondal, Djuroholm, Sweden. An improved furnace for burning briquettes of ore so as to make them hard enough for the blast-furnace.

24,780 of 1903. SAFETY CATCH FOR MINE CAGES.—E. Howells and L. H. Howells, Pontypool. Improved automatic safety device for colliery cages in case of accident to hauling gear.

25,576 of 1903. HAND ROCK-DRILL.—W. M. Maylan, London. Improved hand-operated rock-drill, the drill being hit on the end by a sliding rod and rotated automatically by ratchet motion.

25,932 of 1903. STEEL MAKING.—E. Engels, Dusseldorf, Germany. Adding carbon to steel in the form of carbide of silicon, mixed with sulphate of soda, which helps decompose the carbide.

SPECIAL CORRESPONDENCE.

Denver. Feb. 20.

(From Our Special Correspondent.)

The $6,000,000 suit of the Strattons Independence Co., Ltd., against the trustees and executors of the estate of the late W. S. Stratton was dismissed in the United States Court, Denver, yesterday, through an order of Judge Riner granting the motion of the defendants to strike from the files of the Court the replication filed last week to the answer of the defendants, and also granting judgment on the pleadings for the trustees and executors. The case will be taken to the United States Circuit Court of Appeals.

During the week Governor Peabody and a small party of State officials visited the Cripple Creek district. On his return to Denver, the Governor said that the district is in good condition and prosperity is everywhere visible. The forthcoming pay-roll will be the largest ever paid in the district and there is every indication that the strike is a matter of history. He further said that the strike has been lost by the miners and that most of the strikers have either returned to work on wages or have taken leases for themselves.

The trial of the three miners' union leaders —Sherman Parker, Thomas C. Foster and W. S. Davis—charged with attempted train wrecking on November 17, is proceeding in the District Court. Yesterday C. H. McKinney, the principal witness for the State, gave evidence as to two attempts to wreck trains, giving many details and involving Parker.

It is reported that martial law at Telluride will probably end within a few days. The 83 striking union miners who, as undesirable persons, were deported from Telluride by the military have gone either to Ouray or Silverton, where they are reported seeking work.

A uniform code of signals for all the mines in Colorado is being prepared by the State Commissioner of Mines.

On February 17 a telegram was received in Aspen putting in force the old smelting charges and rescinding the increased rates recently made.

Victor C. Alderson, president of the Colorado State School of Mines, has arranged for 1,200 sq. ft. of space in the mining building at the St. Louis World's Fair for the School of Mines exhibit. There will be also a working laboratory near the mining building, manned by students from the school.

San Francisco. Feb. 17.

(From Our Special Correspondent.)

Heavy rains and snows the heaviest of the winter, have fallen in central and northern California. The rain extended to the southern counties, where it was badly needed. On the summits of the Sierras heavier snows have fallen than during the same period for some years. The placer miners all over the State have begun work washing gravel, and a prosperous season is expected. In some counties, notably Trinity and Siskiyou, the miners hope for a better water season than for several years. Altogether the outlook is a hundred per cent better than it was a week ago. Rainfall is now practically up to the normal.

There is trouble among the stockholders of the Oroville Gold Dredging Co. John Hays Hammond, Cyrus H. McCormick, E. L. Ryerson, James L. Houghtaling, E. A. Wiltsee, A. Cass Canfield, A. Chester Beatty, J. E. Doolittle and F. B. Peabody, owning a majority of shares properly issued, have begun suit against Fred W. Bradley, Wm. H. Crocker, W. R. Berry, Edwin Schwab, W. C. Webb, A. Granger, L. J. Holton and W. J. Goodwin, to prevent the defendants voting 40,000 shares of stock to elect directors, which shares are alleged to have been unlawfully issued. It is alleged that Crocker and Bradley, for their own purposes, have publicly stated that purchases of mining land by the company were of little or no value. The plaintiffs represent that the property can be made to pay with suitable dredges and better methods, and that Bradley and Crocker, fearing that the stockholders holding the controlling number of properly issued shares would elect a board, called a secret meeting on February 4, at which Bradley was authorized to sell 40,000 shares of treasury stock. He took 20,000 shares and Holton and Goodwin 10,000 each at $1 per share. The plaintiffs allege that the price was inadequate, that the stock should have been offered pro rata to other stockholders, and ask the court to declare the extra issue of 40,000 shares nul and void. Philip Wiseman, R. W. Correll and W. M. Rank have brought suit against L. D. Ball, manager of the Yreka Mining & Milling Co., of Rollin, for restitution of $10,000. The plaintiffs agreed to buy the property for the $300,000 and paid him $10,000 at once. Ball handed over certain shares and agreed to place all the stock in escrow. It is contended that he did not and could not, as he did not control all the shares, in spite of representations to the contrary.

The mine is equipped with mill and machinery and is supposed to have been paying well for some years. It adjoins the Evening Star, owned by John Daggett.

The Oneida mine at Sutter Creek, Amador county, is the latest of the Mother Lode properties to come into the dividend paying list. The mine was reopened in 1895. The shaft is over 2,000 ft. deep. The mine is equipped with a fine mill and plant and is in first class condition. The men at the granite quarries at Rocklin, Placer county, having won a dispute on the question of boarding at company's boarding houses, demand more pay. The quarries furnish a large amount of building material for San Francisco and other coast cities.

The famous old Sierra Buttes gold mine at Sierra City, Sierra county, is reported to have changed hands. It has been worked by tunnel for nearly 50 years, and has produced over $14,000,000. The lowest, or No. 9, tunnel is over 8,000 ft. long, and taps the ledge over 3,000 ft. below the croppings. At one time the mine had two mills, one of 60 and the other of 20 stamps. An English company owned it and was successful in California for many years.

The old Pinon gold district, 15 miles from Indio, Riverside county, is to be again worked, Los Angeles men having put in the necessary capital. The Pinon Consolidated Mining Co. having been organized by W. F. Sherwood, L. H. Mitchell, F. H. Vahrenkamp, Frank James and T. M. Whittaker. Plans are being made for a modern mill and cyanide plant.

The five rival salt companies in southern California which have been fighting each other for some time, have now brought the price of salt lower than ever before.

There are 24 or 25 mining dredgers now at work near Oroville, Butte county, and several others are being built; one on the Hilgers place by the American Dredging Co.; Leggett No. 3 is being built on the De Lancie tract; W. P. Hammon is building one on the Wilcox land, and W. P. Baggett, of San Francisco, is getting ready to build one, while El Oro Co. is soon to build another on the Springer place. A number of other dredgers are being built along the Yuba.

Spokane. Feb. 19.

(From Our Special Correspondent.)

Long-time contracts have recently been signed between the big mines of the Cœur d'Alenes and the American Smelting & Refining Co. The Federal Mining & Smelting Co., having about 50% of the output, has made a six-year contract with the smelting company. The Morning mine, owned by Larson & Greenough, has a contract for more than three years. The mines are working to full capacity, with no restriction upon output, and the mine owners, by their employment bureau system, are keeping the old lawless element out of the camp. Eugene B. Braden, formerly representing the American Smelting & Refining Co. here, and now the northwestern manager for the corporation, announces that the smelter there will start with one furnace about March 1. It will handle an unlimited output of ore from the Continental mine, at Porthill, Ida. He is also in charge of the East Helena, Mont., smelter, and has restored things there after a fight with strikers. The plant is working 400 men and handling 400 tons of ore a day. It is paying about $2.40 a day for common labor.

The annual meeting of the Le Roi Co., of Rossland, B. C., was held recently in London and cable dispatches state that Managing Director A. J. McMillan's report for 1903 showed profits of $400,000. Profits for January were $50,000. George Waterloo was re-elected a director.

The court has reaffirmed Kennedy Hanley's title to an eighth interest in the rich Skookum claim, forming a part of the Empire State-Idaho group, at Warner, Ida., and upheld a judgment of about $400,000 for ore extracted. The defense, comprising the Empire State-Idaho Co., Charles Sweeny and F. Lewis Clark, of Spokane, was given 20 days to secure a writ of certiorari from the Supreme Court of the United States. George Turner, of Spokane, representing the defense, will present the motion for the writ.

Toronto. Feb. 20.

(From Our Special Correspondent.)

At the recent annual meeting of the Crows Nest Pass Coal Co., Ltd., in Toronto, the reports showed that development work done included the construction of 346 new coke ovens, bringing the total up to 982, with 146 yet uncompleted. Seven new mines have been opened. The output of coal amounted to 661,118 tons, or nearly 50% over 1902. The net profit was $310,492, of which $303,717 was paid in dividends; $913,526 was received as premium on stock, and $950,511 brought forward from the previous year, leaving $1,870,813 to be carried forward as a balance, of which $145,078 is undistributed profits. The directors were re-elected by acclamation.

Owing to the increase in the price of lead there is considerable interest in the deposits of lead ore in eastern Ontario, a number of which have been more or less developed in past years. The old Hollandia lead mine near Bannockburn, Hastings county, was purchased some time since by the Ontario Mining & Smelting Co., which has been carrying on active development during the past half year, has erected a concentrating plant and put in mining equipment. It is making use of an old lead smelter erected some years ago by the original owners. The galena occurs in a vein of calcite. A number of other lead properties have been reopened during the year, notably the Frontenac mine, about 30 miles north of Kingston.

Victoria. Feb. 16.

(From Our Special Correspondent.)

In the report of the Cariboo Consolidated Hydraulic Mining Co., the manager summarizes last season's mining operations as follows: Total time washing, 53 days; total quantity of water used, 127,083 miners' inches; total quantity of gravel washed, 372,000 cu. yd; average duty of water per miners' inch, 292/100 cu. yd.; gold product, 2,639 oz.; value, $44,944; operating expenses, $81,452. The report predicts that the season of 1904 will be successful, owing to the rains in September and snowfall this winter. Work has been resumed at Willow River and the Slough Creek Co. is exploring the ancient river channels on the La Fontaine. The drift is now about 300 ft. in, and is expected to tap the rich gravels by May 15. At the Slough Creek mine drifting has started again. The Mount Baker-Yale Mining Co. has installed a 10-stamp mill on the property on Siwash creek, near Yale, and will shortly add another battery of 10 stamps. The ore is said to average about $4 per ton.

At Poplar Creek the tunnel on the Lucky Jack is in over 300 ft., and will be driven another 100 ft. The Buffalo and Swede groups are being developed.

The suit of the Star Mining & Milling Co. against the Byron N. White Co., now being tried at Nelson, involves extralateral rights, and the apex of a vein.

The Payne Mining Co. has closed a contract with Aron Hirsch & Son, of Halberstadt, Germany, for the entire output of the mine until January 1, 1905. The Payne zinc concentrates, which will amount to 2,500 tons for the year, will be shipped to Antwerp.

Several of the big mines near Sandon are busy. The Ivanhoe concentrator is producing both silver-lead and zinc concentrates. The

Slocan Star has increased its force, and the Reco is employing some 40 men, and shipping 10 tons a day. The Monitor Co. has practically decided to install a plant for saving the zinc contents of its ore. It is said the Queen Bess has been acquired by Messrs. Potter & Zevicky from the Bank of Montreal.

At the Le Roi mine, Rossland, drifting continues in the 1,350-ft. level, a fine body of ore having been found in the east drift.

The Canadian Pacific Railroad has reduced the rate on freightage of ore from Phoenix to Grand Forks and Greenwood smelters to 30 cents per ton, the former rate having been 37½ cents.

San Luis Potosi. Feb. 16.

(From Our Special Correspondent.)

In Sonora the district around the gold camp of Sierra Madera, about 18 miles east of Cumpas, is reviving; the old Promontorio mines, as well as the San Juan and San Pascual, will be worked again. The Yaqui River Smelting & Refining Co., at Toledo, is buying ores and expects to blow in as soon as it has ore enough stocked. The Missouri-Mexican Mining Co., with G. E. Whittick, of Larned, Kan., president, is to develop a group of mines near the river. The preliminary survey of the railroad of the Cieneguito Mining Co., from its mines on the Yaqui river to Minas Prietos, a distance of 100 miles, is completed. The Greene Consolidated Copper Co. is reported cutting down expenses wherever possible.

At Matehuala, in the State of San Luis Potosi, the mines of La Paz, under the management of W. B. A. Dingwell seem to be the only ones holding their own. These properties have been worked over 100 years and now employ about 1,000 men. The Dolores, near by, of the Guggenheim Exploration Co., is not showing up as was expected, and the Esmeralda, another neighbor, is not doing much. At Maroma, some distance from Matehuala, Mr. Dingvall has put in a new lixiviation works. At Catorce the mines keep up the usual production. The Dolores Trumpeta, of Castillon y Perez, is installing new machinery. At the Cerro de San Pedro, near the city of San Luis Potosi, the Mexican Metallurgical Co. has a hoist up and is taking from the lease at the Begonia shaft of the Victoria Co. about 1,000 tons a month. The Victoria Co., under the management of George A. Laird, which has been producing 3,000 tons a month, now that the new cable tram is in and the spur of the Potosi & Rio Verde R. R., of the Mexican Metallurgical Co., completed from Portozuelo to San Pedro, expects soon to raise the monthly output to 5,000 tons The Cocinero and Borreno are doing very little. There are employed in the camp about 2,000 men, of which the Victoria Co. has over half.

London. Feb. 13.

(From Our Special Correspondent.)

The report of the Le Roi No. 2, Ltd., for the year ended September 30 last, will be read by shareholders with mixed feelings; for while, on the one hand a mining profit has been made permitting of the distribution of £6,000 as dividend, the report of the engineer, Mr. Alexander Hill, shows that there is little prospect of more than a year's supply of shipping ore. During the year 17,550 tons were shipped to the smelter, averaging $15 in gold, 1.59 oz. silver and 2.79% copper, total value $20.69 per ton, which realized $217,750, or $12.40 per ton. At the lower levels exploration work does not disclose any shipping ore, and available ground at higher levels is limited. The value of the ore-bodies is very erratic, and Mr. Hill considers it impossible to estimate the value of the lower grade ores at any reasonable cost. The future value of the mine would appear to depend entirely on the applicability of the Elmore oil concentration process. The report says nothing definite on the result of the tests of the process, for as yet the plant is only being run experimentally, while workmen are being taught the use of the plant, the lowest grade ores, averaging $5 and $6 a ton, are being used, so as not to lose values by unskilled handling of better ores. Also, the plant is a comparatively small one, and the total costs of labor are as high as if it were four times the size; so that for this and other reasons the eventual cost of treatment cannot yet be accurately gauged. Though the directors and Mr. Hill do not commit themselves on the subject, it is an open secret that the process is entirely suited to the ore, and that the extraction is very close. Although there is a prospective source of revenue from the low grade ores treated by this process, the profits can never be large enough to pay sufficiently high dividends to recoup shareholders. The capital of the company is £600,000, and a great many holders paid more than par for their shares. The dividend now declared amounted, as already mentioned, to £6,000, which in itself is a large sum of money, but when distributed round the capital of the company looks trivial as a dividend of 1% per annum.

At the last meeting of shareholders of the Champion Reef Gold Mining Co., of India, the suggestion was made that the shares should be split, in order to make them of smaller denomination and so increase their market. The directors have therefore decided to split each share which is now nominally worth 10s. into four shares of 2s. 6d. each. Originally the shares were £1 par, but in 1897, as the market value of these shares was £6 or £7, it was deemed advisable to split them into two 10s. shares. The prosperity of the mine since then has been so great that the 10s. shares now stand at approximately the same price as the £1 shares in 1897. With a dividend of 165% on a capital of £260,000, with several years' supply of ore ready for mining, and with valuable new discoveries at many points, it is not to be wondered at that directors, managers and shareholders take a rosy view of the future, and consider the shares of even greater value than their present quotation. Many shareholders, however, had a rude shock when reading the paper and the discussion on it by Mr. Mervyn Smith, on the geology of the Kolar field, at last week's meeting of the Institution of Mining and Metallurgy. As the paper is referred to in another part of the JOURNAL it is not necessary to enter into details here. The theory of the flattening of the lode, and of its impoverishment at depth, was rapidly seized on by the pessimists. The shareholders in John Taylor & Sons' companies usually follow the firm implicitly, and do not get scared out of their skins by market or any other rumors. This case has not been an exception, for there was very little effect on the quotations of the shares.

Perth. Jan. 18.

(From Our Special Correspondent.)

Coolgardie.—Bayley mine is in full operation since reconstruction of the company. What appears to be a promising find of opal has been made at an alluvial patch worked for gold by dry blowers. A discovery of coal near Coolgardie is reported, but little is yet known of this. Burbanks gold mine is being thoroughly overhauled and systematic development work is in progress.

Kalgoorlie.—The Ivanhoe is raising ore of good average grade from the Middle and East lodes at the ninth level. At the sixth, seventh and eight levels the ore bodies are opening up splendidly. At the Golden Horseshoe the 50 head of stamps ordered will shortly be erected. The ore reserves are being largely increased.

Menzies.—The new State battery has been started. The Lady Shenton mine is doing considerable development. The district generally is looking well, several mines making good returns. The Menzies Consolidated December returns were 904 oz. of gold from 1,575 tons treated. This mine is most economically managed. The Pictou lease recently struck an 8-ft. reef showing gold freely. Since the opening of the railway to Laverton that district has taken a spurt.

Murchison Fields.—The Great Fingall yield for December was 8,598 tons treated for 11,400 oz. fine gold. The leases adjoining the Great Fingall on the north are being floated locally as the Fingall Associated Co. The Victory United has at the 640-ft. level cut a reef 2 ft. 6 in. wide, assaying 4 oz. per ton. A trial crushing from the Leviathan of 20 tons, returned 40 oz. gold.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. T. R. Gue, of Halifax, N. S., is visiting New York.

Mr. E. V. Bensusan has returned to London from West Africa.

Mr. J. A. Chalmers is on his way from London to Johannesburg.

Mr. F. L. Sizer, of Helena, Mont., is at Sandon, British Columbia.

Mr. N. C. Bonnivie has been on a trip to Deadwood, South Dakota.

Mr. D. C. Jackling, manager of the Utah Copper Co., is now in Utah.

Mr. Edward T. Bailey has returned to England from the Dutch Indies.

Mr. H. Kilburn Scott has reached London on his return from the Caucasus.

Mr. Lawrence W. Tatum, of Chicago, was in Gilpin county, Colo., last week.

Mr. W. L. Austin is visiting Arizona mining districts. He is now at Clifton.

Mr. L. H. L. Huddart is now an officer on the mineral survey of Southern Nigeria.

Mr. L. D. Godshall, of Denver, is at present doing professional work in Arizona.

Mr. William Frecheville returned to London on the *Cedric*, leaving on February 24.

Mr. Thos. W. West is general manager of the La Florencia mines in Sonora, Mexico.

Mr. H. E. Lawson, of Toronto, on his return from Dakota, left for London by the *Cedric*.

Mr. Geo. D. Blood has returned to Salt Lake City after eight months absence in Nicaragua.

Mr. Olaf Wenstrom has returned to Boston after two months of professional work in Mexico.

Mr. W. H. Wiley, of Idaho Springs, Colo., is examining mines in Calaveras county, California.

Mr. Felix A. Vogel has left Joplin, Mo., for Durango, Mex., to examine some iron ore properties.

Mr. Q. A. White, formerly millman at Leadville, Colo., is now engaged at White Pine, Colorado.

Mr. H. Vincent Wallace, from Altar, in Sonora, Mexico, sailed for London by the *Mesaba* on February 20.

Mr. E. H. Teats, formerly of Denver, leaves on the *Piemonte* for Paramaribo, Dutch Guiana, on February 25.

Mr. C. D. Jameson is consulting engineer to the Changtze Kan gold mines in Mongolia, with office at Tientsin.

Mr. H. M. Dieffenbach, of the American Smelting & Refining Co., has returned to Mexico from New York.

Mr. G. B. D. Turner, manager of the J. I. C. mine, at Park City, Utah, has returned to Salt Lake from California.

Mr. Leo Goldsmith sails on February 27 for Colombia, to take charge of placer mines in the department of Antioquia.

Mr. Henry Stern, who is interested in the Yampa mine and smelter, at Bingham, Utah, has been at Salt Lake City.

Mr. Arthur C. Nahl, formerly in Sonora, is now assistant manager at the Progreso mine, near Triunfo, Lower California.

Mr. Robert S. Towne, of New York, president of the Mexican Metallurgical Co., is visiting the company's Mexican plants.

Mr. P. L. Foster, of the London Exploration Co., and one of the directors of El Oro Mining & Railroad Co., is now in Mexico.

Mr. Tony Jacobson, manager of the Columbus Consolidated mines, at Alta, Utah, will be at Houghton, Mich., about February 28.

Mr. S. C. Hazleton has succeeded Mr. Horace K. Masters as superintendent of the United States smelter, at Bingham Junction, Utah.

Mr. Edward Doerr, manager of the Mexican end of the Guggenheim Exploration Co., has returned to Mexico after a trip to the States.

Mr. E. A. H. Tays is manager of the Maconi-Doctor mines in Queretaro, Mexico, for the United Mining & Development Co., of America.

Mr. E. M. Bind, of Torreon, Mex., is now manager of the Gavilanes mines, at Gavilanes, Durango, Mex., where he is erecting a concentrating plant.

Mr. B. T. Bell, editor of the *Canadian Mining Review*, fell down an elevator shaft in the Orme building, at Ottawa, on Feb. 18, receiving severe injuries.

Mr. Henry S. Williams, since 1892 professor of geology in Yale University, recently accepted a call to the head of the department of geology at Cornell University.

Mr. W. B. Roberts has sold his assay and chemical laboratory at Los Angeles, Cal., to H. K. Wheeler Co., of that city, and will spend the next few months examining mines in Mexico.

Mr. J. M. McClave, electro-metallurgist of the Colorado Zinc Co., of Denver, Colo., has installed a Blake magnetic ore separating plant at the Trail smelter, and returned to Colorado.

Mr. Bertram Blount is now practicing under his own name at 76 and 78 York street, Westminster, London, the firm of Stanger & Blount having ceased by the death of Mr. W. Harry Stanger.

Mr. Frank E. Fielding, for 30 years chemist and assayer to the Consolidated California & Virginia mines at Virginia City, Nevada, has joined the H. K. Wheeler Co., a firm of engineers at Los Angeles.

Mr. Mortimer E. Cooley, professor of mechanical engineering at the University of Michigan, is dean of the engineering department, succeeding the late Charles E. Green, who was dean of the department from its foundation until his death, last October.

Mr. F. W. Grey has retired from the firm of Charlton & Co., mining engineers, London, in consequence of his residence in India. Mr. Arthur Dickinson has been admitted as a partner and the business will be carried on as formerly, under the style of Charlton & Co.

Mr. W. A. Scott, who for a number of years represented the *Mining & Scientific Press* in Denver, Colo., and for the past two years was connected with the *Mining Reporter* of that city, has been appointed traveling representative for the ENGINEERING AND MINING JOURNAL.

OBITUARY.

Col. Theodore Bruback, of Salt Lake City, who was extensively interested in mining in Utah, was killed by an accidental fall in the Daly-Judge mine, at Park City, on February 18. He had been a resident of Salt Lake since 1885.

R. J. McCartney, who died recently at the Silver Lake mills, near Silverton, Colo., went to San Juan county several years ago from Leadville to take charge of the large concentrating plant erected by Edward G. Stoiber at the Silver Lake mine. Last summer he was appointed superintendent of the Silver Lake mills, which position he held at the time of his death.

E. J. Chapman, who died recently at Hampton, Eng., was for many years professor of mineralogy and geology at Toronto University. He was born in Kent, England, February 21, 1821, and in his early years followed a military career, serving in the foreign legion of the French army in the Algerian campaign. He afterwards studied engineering in England under I. K. Brunel, and some years later was appointed to the chair of mineralogy in University College, London. In 1853 he accepted the new chair of mineralogy and geology in University College, Toronto, a position which he held until 1896, when he returned to England, having inherited an estate. He was the author of a number of papers embodying the results of original research in his line of work. He also wrote several scientific text books.

In the death of Alvinza Hayward California has lost a mining pioneer. He had for years, with Chas. D. Lane and the Hobart estate, owned the famous Utica mine of Calaveras county, the most productive and profitable gold mine in California. He had numerous other gold mines at the time of his death, and during his career owned several very large producers. The old Hayward gold mine of Amador county held a record for many years as a great producer. It was sold to Hetty Green, who has never worked it since the great fire many years ago. The ditch furnishing water to the mines at Angels, Calaveras county, is part of the holdings of the Utica Co. Mr. Hayward left a smaller fortune than expected, though it amounts to $4,000,000, and his wife's separate property is of larger amount. He was one of the large real estate owners of San Francisco.

Charles F. Mayer, formerly president of the Baltimore & Ohio Railroad, died February 24, at Baltimore, Md., aged 70 years.

Mr. Mayer was born in Baltimore, and educated there in private schools, and in Mount Hope College. In 1865 he joined a company for the development of the gas coal fields of West Virginia, and in 1877 he became president of the Consolidated Coal Co., of Maryland, one of the largest concerns in the country. At the same time he became president of the Cumberland & Pennsylvania Railroad Co., holding that position until 1896. In 1887 he joined the directorate of the Baltimore & Ohio Railroad, and after acting as chairman of its executive committee was elected president in December, 1889. It was under his direction that the construction of the Baltimore Belt Railroad, connecting the main line with the Philadelphia division, was undertaken and completed, and that electric motors were first used for hauling trains.

INDUSTRIAL.

The Niles-Bement-Pond Co. recently bought all the assets of the Milwaukee Machine Tool Co. and the latter will no longer be operated under its original name.

The Hodge Iron Co., of Houghton, Mich., has appointed John A. Traylor its sales agent in the West and has established an office at 509 Equitable building, Denver, Colorado.

The American Zinc & Chemical Co., Denver, Colo., recently incorporated, with a capital stock of $750,000, will erect a plant for the reduction of zinc ores. The company is said to be closely allied with the Denver Ore Purchasing & Smelting Co., of which C. E. Dewey is president.

The United Lead Co., of New York City, recently secured a site at Perth Amboy, N. J., where a large plant for the manufacture of white lead, shot, lead pipe, etc., will be erected this summer. Work on the plant of the company at Granite City, Ill., is reported advancing rapidly.

The Aultman Co., Canton, O., has turned over its elevating and conveyance machinery departments to the Interstate Engineering Co., of Cleveland, which is just completing a large plant at Bedford, O. The Aultman Co. will confine itself to the manufacture of ice making and traction machinery.

The Hogan Motive Power Co. is to erect at once a plant for the manufacture of gas and gasoline engines at New Haven, Conn. The company was organized last April with a capital stock of $100,000. John J. Hogan is president and general manager, L. F. Miller secretary and W. J. Connor, treasurer.

The Monongahela Engineering Co. has been organized with a capital of $45,000, with offices at Pittsburg, Pa., to do general contracting, coal work and brick work. The officials are: Thomas M. Evans, president, and David R. Smith, secretary and treasurer. These, with Stephen W. Tener, R. H. Watson, and J. M. Hoffman, constitute the board of directors.

The plant and assets of the Akron Engineering Co., Akron, O., have been sold to H. W. Cole, of Cleveland, who reorganized the company under the title of the Crown Drilling & Machinery Co. The capital stock is $100,000. H. W. Cole will be president and treasurer of the company and Fred. H. Cole secretary. The company will manufacture drilling machinery.

Two additional blast furnaces are to be erected at the Duquesne plant of the United States Steel Corporation on the property known as the Glass House site, at the eastern end of the present plant. The new furnaces are to be similar in design to the two new furnaces erected at the Edgar Thomson plant at Braddock, will have a capacity of 500 tons daily and each will cost about $400,000.

The Goldschmidt-Thermit Co. has been formed under the laws of New York to exploit in America the alumino-thermic process of welding metals invented by Dr. Hans Goldschmidt of Essen-Ruhr, Germany. E. Stutz, who has offices in the Wall Street Exchange building, New York, is vice-president of the company. The company will conduct business in connection with the chemical and tin smelting of Th. Goldschmidt, Essen-Ruhr.

At the recent annual meeting of the British Westinghouse Electric & Manufacturing Co., held in London, George Westinghouse, chairman of the company, spoke upon that company and the American Westinghouse companies. At the plant of the British company two years new shops have been completed recently having an aggregate capacity of 60% of the older works. The plant now covers about 30 acres of land and employs about 7,000 operators. Trade with the British colonies is stated to be rapidly increasing.

As the maximum boiler horse power in central power stations is only attained during a few hours of the day, and during the greater part of the day the capacity required is much less, it has been found economical to design the boilers and chimneys of ample capacity for the maximum load and to force the capacity by mechanical draft. In the new power station of the Denver Tramway Power Co., Denver, Colo., mechanical draft is used as an auxiliary to the neutral draft provided by a chimney 240 ft. high. Artificial draft is furnished by three Sturtevant electrically driven steel plate fans. The boiler capacity of the plant is approximately 6,000 h. p.

The Allis-Chalmers Co. announces that it has widened its scope of manufacture, and has concluded final arrangements for manufacturing steam turbines, hydraulic machinery, gas engines and electrical machinery. The company is part of the new Steam Turbine Advisory Syndicate, of England, composed of the Yarrow Shipbuilding Co. of England, Tweedie (Vulcan) Shipbuilding Co. of Enlgand, Willans & Robinson, engineers and engine builders of England; Mr. Fullager, formerly chief engineer Parsons Steam Turbine Co. of England, but now consulting engineer for the Syndicate, and the Allis-Chalmers Co. The turbine is of the horizontal type, like the Parsons and Brown Boverie. The company believes this turbine is at least in efficiency and economy equal to the best make of Parsons or Curtis, and is now prepared to build steam turbines of 500, 750, 1,000, 1,500 and 5,000 k.w., and can, if required, build up to units of 10,000 k.w. The largest size that has ever been built of any type of turbine is 5,000 k.w. The license from the Advisory Turbine Syndicate concedes all of the United States, Canada and Mexico, with equal rights and privileges in South America, and rights to do business elsewhere in the Western Hemisphere. The company says further: We have concluded arrangements with Escher-Wyss & Co., of Zurich, Switzerland, whereby we become the sole licensees for the Western Hemisphere of their

hydraulic machinery, several types of which have been installed at the Niagara Falls plant of the Cataract Construction Co., aggregating 85,000 h-p. We have bought the American patents and have become sole licensees for the Western Hemisphere of the Nurnberg Machine Co., Nurnberg, Germany, for its gas engines, and are now prepared to make gas engines up to any required horse-power. At present we are prepared to build gas engines from 250 to 1,500 h-p. These enignes are suitable for consumer gas or the waste gas from blast furnaces. It is in the blast furnace trade that we expect the largest business. Such engines of 1,500 h-p. are now in operation in Germany. We have engaged in the manufacture of generators, motors and electrical apparatus in all its branches, both for stationary and railroad work, power house installation for transportation purposes and electric lighting. We have engaged to take charge of this department of our business Mr. John F. Kelley, formerly of the Stanley Electric Co.; Mr. William Stanley, of the same company, as consulting engineer, and Mr. John H. Kelman, formerly superintendent of the Stanley company as superintendent of this department. In addition we have engaged others of the Stanley company's staff whose services we can use, and have drawn a further supply from the best electrical establishments in this country and in Europe. We have entered the field in the line of prime movers, embracing reciprocating engines, steam turbines, gas engines and hydraulics, and with electrical apparatus combined with any one of these prime movers, and are prepared to estimate upon and accept contracts for complete plants of all descriptions.

TRADE CATALOGUES.

A clever pocket-size catalogue of steam, ammonia and hydraulic rubber packing is issued by the Crandall Packing Co., Palmyra, N. Y. It covers a large variety of styles for the many different uses and should be in every engineer's cabinet.

"Steam Auto Appliances," and especially the Branch condenser and oil eliminator are the subjects of automobile bulletin No. 5, being sent out by the National Oil Burner & Equipment Co., of St. Louis, Mo. The catalogue contains sizes, weights, dimensions and prices of the articles, and numerous suggestions upon the improvement of the automobile by these appliances.

The Richards Pump Co., of San Francisco, Cal., issues a catalogue describing its latest improved deep well water and oil pumps, wind mill pumps, pump heads, etc., supplemented with rules for figuring the capacity of any piston pump, and a few facts regarding the friction of liquids in pipes. A number of favorable testimonials conclude the catalogue, which is of 20 pages.

The Moore process of treating slimes in gold extraction plants is described at length in a booklet recently issued by the Moore Cyaniding Co., at Salt Lake City, Utah. Plants where the Moore process is in successful operation are mentioned. Where the ore-reserves in a mine justify, the company states, it will erect a plant at its own expense and divide the net savings equally with the mine owners.

The Dayton Globe Iron Works, of Dayton, O., has issued catalogue M in the interest of the new American turbine. The details of construction and operation are taken up, and a special feature is the table giving all necessary figures for wheels of any diameter under heads of from 3 to 100 ft. The catalogue concludes with a treatise on the construction of head races, wheel pits and tail races, with many valuable suggestions.

The "Marsh Steam Pump" is the title of catalogue No. 12, which the American Steam Pump Co., of Battle Creek, Mich., has issued. The catalogue is more comprehensive than many published, giving, as it does, illustrations and tables of steam pumps for various uses, as boiler feed and vacuum pumps. Air compressors, deep well pumping engines and pumps for industrial work have also received their quota of space and attention.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

(From Our Special Correspondent.)

Arizona Mining & Development Co.—A 20-stamp mill and concentrator are reported on the way to the Gold Treasure mine, in the San Jose mountain, near Naco. Ore is to be taken down the mountain by a tram.

Black Diamond Copper Co.—This company which has been getting its water from the stream pumped from the Commonwealth at Pearce is now, since the Commonwealth shut down, putting in a powerful force-pump at the well at Pearce, from which water will be delivered to the Black Diamond smelter, seven miles distant.

Tombstone Consolidated Mines Co., Ltd.—The main shaft is 717 ft. deep with sinking in active progress. Two of the powerful pumps are working at the 700-ft. station, and the daily output of water is about 2,150,000 gal. Up to January 1 675,000,000 gal. had been pumped out and the water level has been lowered 80 ft., as shown in the shaft of the Lucky Cuss over a mile away. The west drift on the 700 intended to intersect a winze from the 600 is now 115 ft. long. The heat is great, the mine water temperature is over 80°, which appears to indicate a deep source. Crude oil is used for fuel and is much liked. About 40 carloads of ore a month are shipped from the main shaft and from 10 to 20 are obtained from other workings, making in all about two carloads a day. Some very rich ore has been found in the old stopes of the Contention mine, some of it showing free gold. At the West Side lode the shaft is 63 ft. below the old water level and a drift is being run toward one of the anticlinal folds in limestone, where, it is hoped, an ore body will be found. At the Lucky Cuss, the old dumps, consisting largely of manganiferous limestone with a few ounces of silver, are being rapidly shipped to the El Paso smelter for flux.

PIMA COUNTY.

Old Dominion.—All the machinery for the new smelter and powerhouse is on hand and being placed. A battery of converters is being installed. A large new air compressor is in operation at the shaft head, and a large flue dust chamber is being erected. Two electric locomotives have been received for service about the smelter. Hereafter the ore will be brought from the mines to the smelter by standard-gauge ore cars, and the aerial tramway from the main shaft will be taken down.

CALIFORNIA.

AMADOR COUNTY.

Central Eureka Mining Co.—At this property Sutter Creek 70 men are employed. A contract to sink the shaft from the 2,100 to the 2,200 level has been let.

Del Monte Mining Co.—This company has executed a trust deed to the O'Neills to secure payment of indebtedness. Geo. I. Wright has been elected superintendent and James J. Wright, secretary. Work in the big tunnel is resumed and a more powerful drill is at work. The tunnel is now in 700 ft. and may be completed by April.

Keystone Mining Co.—Two new Griffin mills have been added to the crushing plant at this mine, Amador City. Developments are under way and the pay rock is averaging very well.

Oneida Mining Co.—At this property near Jackson 7,200 tons of ore are taken out monthly. This month a dividend of $40,000 was declared. A new electric pump has been ordered.

CALAVERAS COUNTY.

Forty-nine.—In this mine at Douglas Flat a good body of pay gravel has been struck.

Reilly Ranch.—This place on the Calaveras river, between San Andreas and North Branch, has been sold for $5,000. A dredger will be installed and the ranch mined on a large scale. There is too much water for ordinary placer work.

EL DORADO COUNTY.

El Dorado Copper Co.—A full force is now at work sinking the three compartment shaft on the Eureka-Woodside mine of this company. W. E. Everson, superintendent.

New Highland Gold & Copper Co.—Men are at work building an extension to the debris dam of this mine on Mameluke hill and hydraulicking will commence as soon as the license is issued by the California Debris Commission.

INYO COUNTY.

Douglas Mining Co.—The mines of this company in Silver Star district have been sold, including 15 claims, mill and tailings. Mark Averill will superintend the development work for the new owners.

Radcliff Consolidated Mining Co.—Some of the base ore from this property has been found satisfactory, and arrangements are being made to work it.

KERN COUNTY.

J. M. Groves is arranging for the building of a three-stamp mill in Fountain Springs district.

Baltic Mining Co.—Tungsten ore has been found on this property at Randsburg, and several tons taken out. C. H. Wynn is manager.

Diamond.—This property at White River, is being developed by H. Faucett, of Vallejo, and others, who have a two-stamp mill running on ore from the claim.

Flamioflame Mining Co.—This company, operating in Jawbone cañon, has closed down for the present.

LOS ANGELES COUNTY.

American Iron Co.—Samples of iron ore from La Canada precinct, 18 miles from Newhall, have proved good and it has been decided to install machinery.

Southwestern Glass Co.—This company, of Los Angeles, has given a contract to Mitchell Bros., of Newhall for several hundred tons of silica to be mined from a new deposit eight miles west of Acton.

MARIPOSA COUNTY.

Malone.—Preparations for work are being made at this old mine near Mariposa, owned by the Bear Creek Mining Co. A new shaft has been sunk. Buildings and machinery of the Horseshoe mine in Hunter's Valley have been bought and moved to the mine.

NEVADA COUNTY.

Central Consolidated Mining Co.—At this mine, near Grass Valley, Oscar Coflin, superintendent, some good free gold ore is coming from the Duval vein. A mill is to be built in the spring.

Federal Loan.—This property at Willow Valley is again controlled by the Ogden Bros. The mill is crushing ore from the 700-ft. level.

Gold Tunnel.—This mine, Nevada City, now reverts to the Allen estate, the company having defaulted under its bond, after having spent some $60,000 on the property.

Round Mountain.—This mine, four miles from Grass Valley, has been bonded by Huckins Bros. and Alfred Scrivens. Small hoisting works are to be erected and the property worked.

Spanish Ridge.—The 10-stamp mill has commenced crushing ore at this mine, Washington.

Union.—At this mine, North Bloomfield, A. L. Gassaway, superintendent, 80 men are employed. The gravel is drifted, and hauled to the 20 stamp mill by a locomotive drawing 40 mine cars.

PLACER COUNTY.

Big Dipper.—F. H. Schulze and others are leasing a portion of the ground of this mine at Iowa Hill and are running an upper tunnel now in 1,000 ft. They have 500 ft. to go to reach good gravel, located through the main tunnel by a series of upraises. The new upper tunnel will admit of getting this gravel out cheaply.

Morning Star.—Fagg & Bernardt are running drifts at this mine on Rock creek on the 100 ft. level. There are two ledges and the rock shows up well.

SAN BERNARDINO COUNTY.

Colorado River Gold & Copper Co.—W. Field, manager of this company, states that reduction works are to be built.

SIERRA COUNTY.

Croesus Mining Co.—At the Plumbago mine of this company, M. W. Mather, manager, 53 men are at work and 15 stamps are kept dropping. Some rich ore has been taken from the mine recently.

Oriental.—The ledge in the tunnel of this mine near Alleghany, Mason W. Mather, manager, was tapped 3,533 ft. from the mouth of the tunnel and about 750 ft. below surface.

SISKIYOU COUNTY.

Golden Eagle.—A. C. Brokaw has men taking ore from this mine on Indian creek, and intends putting up a quartz mill shortly.

Mount Vernon.—This mine, near Yreka, which recently changed hands, will soon have men at work, and a mill will be built.

TRINITY COUNTY.

Lowden Ranch.—H. G. Amstock, H. B. Bunnison and Harry M. Morse, of San Francisco, have made the first payment on the bond on this ranch on Trinity river. The ground is to be dredged. The purchasers are the controlling stockholders of the Trinity Gold Dredging Co., which owns the Poker Bar dredging properties near the ranch, on which a dredge will be built this spring.

TUOLUMNE COUNTY.

Hope.—This mine is being operated by a Mr. Street, of San Francisco, with work in charge of Superintendent Corrigan. The property is in good shape and the mill ready to run. A shaft has been started to strike the vein below the tunnel level.

John Royal.—This mine is now yielding good ore from a shoot recently found.

COLORADO.

BOULDER COUNTY.

Big Five.—A receiver has been appointed for this company, operating in Boulder and Clear Creek counties. Frauds, alleged to amount in the aggregate to $1,000,000, are charged by Dr. George A. Suffa, of Boston, against the president, W. P. Daniels, and the secretary, N. C. Merrill, of the company, both of Denver. The eight companies in the Big Five combination, it is reported, have an aggregate of nearly 13,000,000 shares sold, realizing about $4,000,000. The complainant avers, it is stated, that the promoters have, in spite of the unprofitable nature of the mining operations, made money by the promotion of the companies.

CHAFFEE COUNTY.

Buena Vista Mining Co.—This company, recently purchased the Hancock, Reliance and Kathaleen claims, 20 miles west of Buena Vista, for $3,000. Machinery will be installed and work commenced in the spring. Buena Vista men are reported behind the company.

CLEAR CREEK COUNTY.

Gold Tunnel & Railway Co.—This company has 25 men working the Highland Mary mines in Cunningham gulch, near Idaho Springs. The 100-ton mill has been idle for 30 days, owing to water shortage.

Kirtley.—Ward & Co. are reported making regular shipments, from this mine on Leavenworth mountain, near Georgetown, that net from $250 to $300 per ton.

Santiago.—Frequent shipments of gold ore running 6 to 10 oz. gold per ton are reported being made from this mine in East Argentine. The company has decided to construct a rail tramway from the mine to a point opposite the Baltimore tunnel above Silver Plume, where bins will be built. From there the ore will be sent by aerial tramway to a concentrator, to be erected at the Baltimore tunnel. The rail tramway will be about three miles long, and the aerial tram about one mile in length. The Santiago and the Baltimore tunnel properties are both owned by the Hazelton Consolidated Mining Company.

Ward.—The contract has been awarded for the new mill on this lode for Tanner, Anderson, Carlson and associates. The main building will be 30 by 30 ft., two stories high, and the engine and boiler room will be 26 by 56 ft., one story high. An engine and two boilers are to be installed. For the present 10 stamps will be put in, but the power is sufficient for a material increase. The ore from Ward lode, which is low-grade, will be dumped into the mill and treated by amalgamation and cyanide.

(*From Our Special Correspondent.*)

Plans for a 350-ton concentration plant for the K. R. S. Mining & Milling Co., of Idaho Springs, have just been completed by W. H. Kinnon, of Denver, and construction will be commenced at once.

EL PASO COUNTY.

Henry B. Haigh and associates, former owners of the Telluride Reduction Co., at Colorado City, have let a contract for the erection of a $10,000 three-story brick and steel building, to treat ore dust from the various Colorado City reduction plants. The new building will be near the Telluride works.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Boston Mill.—This rapid-drop 80-stamp mill, on North Clear creek, at Black Hawk, is being overhauled to work ores from the Cook and Gregory-Bobtail properties. O. B. Thompson, Black Hawk, is manager.

Cashier Gold Mining & Reduction Co.—A shipment from the Pittsburg 600 level gave values of 7.79 oz. gold, 13.45 oz. silver and 11.20% in copper. The shaft is being sunk 100 ft. and new machinery will be required. The regular 60-day dividend of $2,400 was paid during the past week. B. L. Campbell, Central City, is superintendent.

Five o'Clock.—A one-half interest in this group, in Central mining district, has been purchased from W. H. Myres by George D. Riddell, of Boulder, for $10,000. The new owner will develop the group.

Happy Hollow.—Surface ores from this property, near Gamble gulch, are said to show values ranging from 17 to 21.32 oz. gold to the ton. C. E. Churchill, of Rollinsville, is in charge.

Kansas-Burroughs Consolidated Mining Co.—A new hoisting cable, 3,000 ft. long and 1 in. thick, has been delivered to the Phœnix-Burroughs mine, on Quartz hill. The English owners are working nearly 75 men on company and leasing account and the daily production ranges from 45 to 50 tons. R. Sykes, of Central City, is manager.

Nashville.—Oliver & Co., of Idaho Springs, are installing a steam hoist on this group, in Russell district, and will erect shaft buildings. Lewis Oliver, of Idaho Springs, is manager.

Procunieur.—This property, in the Hawkeye district, is being examined by Denver men for eastern people.

Sextette Copper Mining Co.—Kansas City, Ohio and Dakota capital is interested in this company, operating claims in the South Boulder district under a lease and bond. High-grade copper and silver ores have been taken out. John Peterson, Baltimore, Colo., is superintendent.

Twolon Mining Co.—Boston men interested in a lease and bond on the 2.40 group in Russell district have been making increased shipments of late. S. Hoskin, of Central City, is manager.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Caribou.—Daily shipments are 150 tons of iron and lead carbonates.

Fortune.—James McNeece, the owner, is shipping from the lower levels ore that runs 12 oz. gold. Lessees are shipping fair grade silicious ore from the upper workings.

Favorite.—This claim in South Evans gulch is shipping 300 tons per month of very good silicious ore. The flow of water is heavy.

Huckelberry.—This property in St. Kevin district will probably suspend ore shipments until the roads become better, but development work will be pushed.

Penrose.—The old water and steam pipes have been taken out and retimbering is under way. When completed new machinery will be installed and the shaft sunk 250 ft. deeper.

Radium.—This property in French gulch, 8 miles from the city, has a tunnel in 500 ft., reported to show at the breast ore that runs from $50 to $200 per ton, the principal values being gold. The width of the ore body has not been determined.

Silent Friend.—Work is pushed, but the ore coming out is being stacked until the roads open.

Wild Cat.—The new shaft house is completed.

PUEBLO COUNTY.

Philadelphia Smelter.—It is reported that this smelter at Pueblo is to be reopened as soon as the ore supply can be arranged for. About 1,000 men will be employed.

SAN JUAN COUNTY.

Barstow Mining & Milling Co.—The mill in Commodore gulch, near Silverton, was started on ore February 8. It is equipped with Wilfley tables, slime tables, spiral pumps, etc. Electric power to run the five electric motors is brought over the range from the Ames power plant on the Telluride side. The Bobtail mine, the main vein worked by the company, has been tunneled 2,800 ft. in the mountain, exposing the vein for 2,000 ft. The company is to double the capacity of the 40-stamp mill this summer, making 80 stamps and a capacity of 300 tons daily.

Esmeralda.—The main shaft in this mine in Minnie gulch, near Silverton, is down 185 ft., and is being sunk with two air drills. A hoisting plant is installed, 17 men are employed, and several hundred feet of drifts have been run. The shipments have averaged the past season about 230 tons per month, running near $40 per ton. R. W. Hollis is manager.

Great Eastern.—A bond and lease was taken recently on this property, in Burns gulch, three miles above Eureka, by Thomas Colmer and others. Considerable silver-lead ore is said to have been shipped from the mine workings. It is stated that a concentrating mill is to be erected at the mouth of Burns gulch on the Animas river early next summer, to treat the ore, and that the mine and mill will be connected by an aerial tramway.

Notaway Gold & Silver Mining Co.—The Detroit & Colorado Mining & Milling Co. has taken over the seven claims formerly owned by this company on the east slope of Sultan mountain, near Silverton. A. J. Vivian is to be in charge of operations.

Royal Mining & Investment Co.—This company, it is reported, has opened a 20-in. vein of copper ore in the drift run on the Copper Queen vein on the east end of the Sultan mountain. The management has an air compressor, and has completed a crosscut tunnel several hundred feet long to tap the veins. The mine has produced high-grade galena and copper ore with silver values. John E. Woods is superintendent.

Sunshine.—In this mine, above Eureka, owned by the Wigwam Mining Co., contractors are driving a long tunnel. Last season a new power plant was installed. The manager was recently in Chicago conferring with the stockholders concerning the erection of a large concentrating mill near the new power plant, as much milling ore is reported exposed.

SAN MIGUEL COUNTY.

(*From Our Special Correspondent.*)

There are now close to 1,200 men working in the mines of the Telluride and the Ophir districts. The military force has been reduced to 64 men, and ore production is becoming normal.

Double Eagle.—With 1,800 ft. of development already done this company will commence production under favorable conditions. The Double Eagle properties consist of 12 claims in one of the richest sections of Bridal Veil basin. The work thus far has been development, with plenty of ore in sight. The ore shows free gold and tellurides with some yellow copper.

TELLER COUNTY—CRIPPLE CREEK.

Gold King Mining Co.—The report of this company for the year ending December 31, 1904, shows a loss of $17,543. The receipts from the mill aggregated $37,514. The total disbursements were $55,057. The chief expenses were: Wages, $29,278; fuel, $11,571; general expense, $6,013. The total ore product for 1903 was 1,668 tons, the gross proceeds being $31,078. The average net value of ore for 1903 was only $18.23. The cash on hand December 31,

1903, was $79,447. At the annual meeting February 6 the following directors were elected: E. A. Colburn, William Lennox, John Lennox, C. H. Dudley and W. L. Kirkwood.

(*From Our Special Correspondent.*)

A great deal of leasing is going on in the district; many miners are running small leases and a number of large concerns operate large leases. The royalties run from 10% up, the most common are from 15% to 30%.

C. K. & N.—This company has declared a dividend of 1c. per share on its outstanding stock, or a little over $14,000. The money to pay this dividend was received from royalties. The property is reported looking very well. The lease worked by Horace Granfield is probably one of the best leases ever given in the Cripple Creek district.

Jack Pot.—At the recent annual meeting at Cheyenne, Wyo., the following directors were elected: A. E. Carlton, J. A. Hayes, F. M. Woods, H. E. Woods, J. H. Hobbs, A. M. Stevenson and Irving W. Bonbright.

Little Bessie.—Work is resumed on this property, on Beacon hill, north of the El Paso, after two months' idleness. Considerable work has been done, but so far no ore has been shipped.

Orphan Belle.—The suits against the Isabella, which aggregated about $1,500,000, have been dismissed in the District Court. This was one of the results of the recent consolidation of the Orphan Belle and Isabella. The suits were for ore alleged to have been taken out of Orphan Belle property by the Isabella.

IDAHO.

BOISE COUNTY.

Lincoln.—The mill at Pearl is equipped with a 50 h. p. dynamo, Westinghouse transformer, Chilean crusher, with a capacity of nearly 100 tons per day; eight Wilfley tables, which produce about 25 tons of concentrates daily, an engine house and assaying plant. There has been about 4,000 ft. of underground work done on the Lincoln, which is being worked through an incline. A pump has been installed underground. The ores are sulphides, carrying gold and silver. David Kennedy, of Kingston, N. Y., is manager of the company.

IDAHO COUNTY.

Le Roy Mining Co.—W. H. Plummer, of Spokane, has organized the Le Roy Mining Co. with Philadelphia capital to work the Homestake group, near Elk City. He reports the company has bought the property from Hye Bros., of Elk City, for $50,000 and that a small stamp mill will be erected.

Lucky Lad.—This mine, at Buffalo Hump, shut down February 1, due to money matters. About $30,000 has been spent, mostly in buildings and machinery; 130 ft. of shaft sunk and 250 ft. of drift run.

Salmon River Gold Mining Co.—This company, of Spokane, recently incorporated, has secured the Moonbeam group of mining claims on Crooked creek, and the Merrimack, an adjoining group of five claims, about 12 miles south of Buffalo Hump. A. E. Barnes is president, and M. J. McCabe, secretary. E. P. Beether, Hugh McFadden and G. P. Mulcahy are also interested in the company, which is capitalized for $1,500,000.

(*From Our Special Correspondent.*)

Atlas.—This Buffalo Hump mine is showing gold ore in the winze. The drifts were continued to the end of the line of the Atlas claim and showed two shoots of ore.

Crackerjack.—The mill will be running by March 15. The ledge should be cut in about 70 ft. when drifting with machine drills will commence both ways.

Dewey.—This company, owning the Dewey mine, near Grangeville, is to install a 50-ton concentrating plant at once at an expense of about $20,000, including Wilfley tables, Huntington rolls, etc. A Hendryx agitator will be used. The property is owned by Seattle people and Otto Abeling is general manager.

Granite.—The winter's work ends this week. The ledge is badly broken, but some good bunches of ore have been found. When spring comes drifting will start at a depth of 250 ft.

Jumbo.—The 10 new stamps are dropping.

SHOSHONE COUNTY.

O. K. Consolidated Mining Co.—A meeting is to be held shortly to consider the erection of a concentrator. The property is at Government gulch, near Wallace. Since 1899 $70,000 have been spent in development and the property opened to a depth of 400 ft. On the 400 ft. level the ledge is 12 ft. wide. Considerable work has been done on the 200 ft. level. The princial owners are residents of the Cœur d'Alenes and include B. F. O'Neil, Ole Linn, John W. Flink, N. Wittner and Ewen McIntosh.

(*From Our Special Correspondent.*)

Constitution.—About 650 ft. of development on the vein has been done within the year on this Pine Creek property and the lode is opened to a depth of 400 ft. The ledge is 300 ft. wide on the surface and the lower workings show a 3-ft. pay shoot 500 ft. long, said to average 10% lead and 8 oz. silver.

Heinze Lead & Silver Mining Co.—This company has been incorporated by H. E. Lineweaver, H. E. Castle E. C. Gerwig, Roy Dorothy and H. S. Anderson, all of Pittsburg, Pa., to do business in the Cœur d'Alenes. It has a South Dakota charter. Capital is $1,000,000.

Pine Creek Camp.—Aside from the Constitution, eight or 10 properties are working on this new camp west of Wardner. The Highland Chief Co. is building a flume to supply power for its sawmill and air compressor. An eight-drill plant is ordered. The company has made a third payment on its bond. The Bobby Anderson has a second car of ore out, ready for shipment.

INDIANA.

(*From Our Special Correspondent.*)

The annual report for 1903 of State Mine Inspector Epperson shows an increase in the number of fatalities 33 against 24 for 1902. The greatest number of deaths was caused by blasts not fired as the mining laws provide. There was an increase in the number of accidents also, there being 154 accidents classified as 'serious,' and 176 as 'minor.'

GREENE COUNTY.

(*From Our Special Correspondent.*)

Atlas.—One hundred and fifty miners at this mine have struck because the company refuses to arbitrate the discharge of a miner.

KNOX COUNTY.

(*From Our Special Correspondent.*)

No assurances are at hand that the renewal of the negotiations for the new wage scale in the competitive districts will avail anything in the convention called for February 29. It is even asserted that complications are increasing and that the joint interstate agreement may fail.

Sugar Loaf.—An attempt to destroy machinery at this coal mine, near Vincennes, was made on February 18. An explosion destroyed the pumps and engines. The miners are out on a strike.

SULLIVAN COUNTY.

(*From Our Special Correspondent.*)

New Pittsburg Coal & Mining Co.—This company has bought 550 acres of coal land and will erect a fine new double mine that will be modern in every respect. It will be equipped with the latest machinery and devices for mining No. 6 and 7, and will employ a large number of men. The company's office will be in Shelburn.

MICHIGAN.

IRON—MENOMINEE RANGE.

Dunn.—The diamond drill work has been suspended, and the drill removed to the Crystal Falls mine. The result of the drill work has not been given out. The pumps have been removed and the mine is filling with water.

Penn Iron Mining Co.—On this company's Baker property at Stambaugh, the diamond drill is boring the second hole. In the first hole, across the formation, ore was struck at a depth of 325 ft. The drill penetrated the deposit 95 ft., and 70 ft. of ore is said to have assayed over 60% iron.

MINNESOTA.

(*From Our Special Correspondent.*)

The iron ore hauling roads of St. Louis county pay into the State treasury nearly one-third of the tax paid by all railways of the State. All roads pay 3% on gross earnings in lieu of other taxes. Last year the three iron ore roads paid a little more than $425,000, and the tax paid by all roads amounted to about $1,600,000. The mines of the county pay $600,000 in taxes every year. The total State expenses are about $2,500,000 a year, of which the mining roads pay more than one-sixth.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Explorations have begun in section 12, T. 58, R. 15, southeast of the find recently made by G. A. St. Clair. This work will be on the ice of Embarras Lake to prove if ore exists underneath. It has been found on the north side of the lake already.

Explorations have begun in section 28, T. 58, R. 19, by the Cleveland Cliffs Iron Co., on land recently secured by Wm. Rock, et el., after a suit as to boundaries with the Oliver Iron Mining Co. This land was explored by the Donora Mining Co., and a large tonnage of medium ore found, but Rock and associates claimed the boundaries had been moved, and gained title to a strip on which the Cleveland Cliffs is now at work.

Canisteo Mining Co.—This company will open two properties in T. 56, R. 24, only about 4 miles east of the Mississippi river and Grand Rapids, with 3-compartment shafts, and has already begun work. These are the only properties in that region which show any activity. They were explored by E. J. Longyear and G. G. Hartley last year, and while somewhat sandy and lean, contain a good deal of excellent ore. They lie just southwest of the old Diamond prospect, and close to the Holman, which was explored and abandoned by the Donora Mining Company.

Oliver Iron Mining Co.—At the new Howard mine, on the Chemung purchase, a shaft is going down through quicksand, and will reach ore at about 100 ft. The ore is of very fine grade and a large tonnage will be made in 1905. Near this property, about in the center of T. 58, R. 20, there are more new mines than at any other point in the Lake country. These include the Shenango, of the Clairton Steel Co., the St. Clair, Morris and Monroe, of the Oliver, the Albany of Pickands, Mather & Co., and one or two others. The district is destined to be important.

Pitt Iron Mining Co.—This company, which has been working a small force in its Miller mine, is to begin hoisting in April, and will make a fairly large shipment the coming season. The mine pays a royalty of 35c. a ton and has a 100,000-ton minimum.

Republic Iron & Steel Co.—This company's Pettit mine has installed a triple expansion, compound, condensing Prescott pump of 3,500 gal. a minute capacity and is now lifting about 2,000 gal. The mine is the wettest on the range now that the Penobscot is closed down.

MONTANA.

POWELL COUNTY.

Coloma Gold Mining Co.—This company, owning the Comet group near Coloma, has nine men sinking the main shaft, now down about 400 ft. A 15-ton Huntington mill is on the property.

FLATHEAD COUNTY.

Snowshoe.—This mine, near Libby, has suspended shipments. It is stated additional machinery will be put in next summer, consisting of Wilfley tables, a Huntington mill and some slimers. The working shaft is to be sunk deeper this winter.

LEWIS & CLARKE COUNTY.

Whitlach Mining Co.—This company has been incorporated with a capital stock of $1,000,000 by F. L. Sizer, A. W. Martin and H. N. Carroll, to operate the property of the National Mining Co., near Unionville, under a lease and bond.

MADISON COUNTY.

U. S. Grant.—The Grant Mines Co. has been organized to work this property, near Virginia City. The capital stock is $2,500,000. H. A. Hull is president and W. S. Calder secretary. The directors are L. D. McCall, A. P. Dewey, W. L. Simonton, Mr. Roe and A. J. Denniston.

SILVER BOW COUNTY.

None Such.—The Amalgamated Copper Co. is developing this claim, in the northwestern part of the Butte district, with 30 men. The shaft is down about 125 ft.

OREGON.

BAKER COUNTY.

Morning.—This mine, it is reported, has been bonded by the Eastern Oregon Development Co. for $125,000. The owners are Cooper, Chinholm, Ames and Simmons.

Snow Creek.—The mill at this property, near Sumpter, is running night and day. The last cleanup is reported to have produced a $5,000 gold brick.

Virginia.—A battery of 10 stamps is going in on this property, near Sumpter, and the Parker rotary stamp mill is to be removed. The shaft is down about 210 ft., with numerous drifts. T. M. Davis is superintendent.

JOSEPHINE COUNTY.

Condor Water & Power Co.—This company is about to install a 20-stamp mill on its Braden property, near Grant's Pass. The power will be supplied by the company's power dam four miles away, which was recently completed. The Braden was operated several months with a 5-stamp mill. C. R. Ray is manager.

Eureka.—A 10-stamp mill is working on this property on Soldier creek, near Grant's Pass, and the ore is reported improving. A. F. Nelson is manager.

Oregon Mining & Development Co.—This company has a giant at work under 125 ft. pressure on its 80-acre tract near Grant's Pass. Water is derived from Bummer creek. James Baumgardner is manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Delaware & Hudson.—This company has two breakers under construction, one at Olyphant and one at East End. At East End the frame work and a portion of the machinery is in place, but work is suspended and all the carpenters sent to Olyphant to rush the construction of that breaker, the destruction of which recently threw at least 1,000 men and boys out of employment, and cut off the shipment of about 2,000 tons of coal daily. Both breakers will be operated by electricity. The company is sinking another shaft at Olyphant, and it is expected another breaker will be in operation before the end of the year.

Lehigh Valley Coal Co.—This company has announced that all the colleries in the Shamokin district which have been idle since October 1 will resume operations on March 1, employing 2,000 men and boys.

BITUMINOUS COAL.

Orient Coke Co.—This company has struck coal on its land near Uniontown at a depth of 551 ft. The company is capitalized at $1,000,000 and has 1,200 acres of coal land in Redstone township. O. W. Kennedy, who recently resigned as general superintendent of the H. C. Frick Coke Co., has bought an interest in the company and will become general manager March 1.

Pittsburg & Eastern Coal Co.—This company recently purchased 4,000 acres of coal land on the Panhandle road, in the vicinity of Burgettstown. Three shafts have been sunk and the company is now installing the cages and other machinery.

Powhatan Coal & Coke Co.—This subsidiary company of the Buffalo & Susquehanna Iron Co. has taken over the coal interests of the Buffalo & Susquehanna Railroad at Tyler, Pa., in addition to the properties at Sykesville, Pa. The company intends to erect 400 coke ovens at Sykesville and 200 at Tyler.

Washington County Coal Co.—This company recently organized, has secured 590 acres of coal land in Washington county, in Jefferson and Cross Creek townships.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Clara Bell Gold Mining Co.—The shaft is 225 ft. deep. The 2-stamp Tremaine mill is being overhauled. Frank Hebert, of Custer, is principal owner and president.

Ivanhoe Gold Mining Co.—The new machinery is in position and sinking has begun. H. F. Ratte, of Custer, is in charge.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Big Four Gold Mining Co.—The framework for the new shaft house, to replace the building destroyed by fire, is up. As much of the old machinery as may be repaired will be used. H. A. Noble, of Hamburg, Ia., president, is purchasing agent.

Homestake Mining Co.—Five specialists are working on the slimes question, including George Moore, of Salt Lake, general manager of the Moore Cyaniding Co. B. C. Cook and D. C. Boley have been working on the problem several months. The company is at present saving about 88% of the values. Nicholas Treweek, who was foreman of the underground workings nearly 20 years, has returned to the company's service and is in charge of the work at the Washington tunnel, the northerly end of the Homestake ground.

Imperial Gold Mining Co.—The cyanide plant at Deadwood is again under full headway, after an idleness of over six months. It is supplied with ore from the Imperial ground in Blacktail gulch, and is also receiving some custom material. John T. Milliken, of Deadwood, is mill superintendent. W. S. Elder, of Deadwood, is president.

Spearfish Gold Mining & Reduction Co.—The cyanide mill has resumed, after several days' idleness on account of deep snow.

Venture Corporation.—A bond has been held for several months on the properties of the Wasp No. 2 and Alder Creek Mining companies, with contiguous groups, aggregating 400 acres, on Yellow creek, south of the Homestake. The price is reported as almost $500,000. An extension has been obtained and it is said the bond will be taken up. The companies have cyanide plants, the former of 125 tons, the latter of 65 tons aily capacity. The Wasp is running regularly, but the Alder Creek is closed.

TEXAS.

CLAY COUNTY.

(*From Our Special Correspondent.*)

Henrietta District.—There are now 15 producing wells in this field, and although none are big producers, the light gravity of the oil makes it worth three times as much as the heavy coast petroleum. The latest producers brought in are the well of E. K. Pedrick, C. M. McAffee and the Denton Henrietta Oil Co., while Fuller & Corbett, Walton & Stevenson, and the Corsicana Petroleum Co. are drilling.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Batsons Prairie District.—The Parafine Oil Co. and the Higgins Oil Co. have let the contract for a 6-in. pipe line to Sour Lake and the Security Oil Co. is putting in an 8-in. line. New wells are those of Ed. Prather, J. W. Sharp, Moonshine Oil Co., D. R. Beatty, W. E. Brice and Batson Oil Co.; the Prather well adds 600 ft. to the proven field. Many wells are being drilled and no dry holes are recorded to date.

Sour Lake District.—The Oil Producers' Storage Co., which purpose storing the product of well owners not operating pipe lines, is meeting with reasonable success in its organization. Its promoters disclaim any intention to boost prices, but a strong pool that can and will handle the product of needy operators will bring about a much desired increase. The field is producing 15,000 bbls. daily and prices range between 27c. to 31c. at wells.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Beaumont Oil Field.—The Higgins Oil Co. is drilling three wells; the Guffy Petroleum Co. two; T. C. Stribbling one, and many wells are being cleaned out. The producing wells number about 125, and the daily production is about 10,000 bbls. The large crude buyers are offering 30c. at the wells and a few sales have been made as high as 31c., but most operators are holding out for the expected advance.

UTAH.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic.—Shipments for the week ending February 19 amounted to 133 carloads, as follows: Centennial-Eureka, 48; May Day, 1; Uncle Sam (crude), 2; Uncle Sam (concentrates), 2; Yankee Con., 4; Salvador, 1; Gemini, 18; Bullion-Beck 9; Eagle & Blue Bell, 3; Grand Central, 20; Lower Mammoth, 12; Carisa, 1; Victor, 2; Dragon Iron, 8; miscellaneous, 2.

Raymond and Illinois.—The boards of directors of these companies have agreed on a plan of consolidation, subject to ratification by the stockholders. It is proposed to form a new company with 400,000 shares, par value $1, the Illinois shareholders to receive 150,000 shares.

PIUTE COUNTY.

(*From Our Special Correspondent.*)

Annie Laurie.—An official of the company has confirmed the report that a deal is pending for the sale of this mine. The price is believed to be around $7,000,000.

Gold Development Co.—The recent strike in the Log Cabin mine has developed greatly. Eight samples, taken each day since the vein was struck, over a month ago, averaged $5.80 gold to the ton. The vein is reported to be fully 100 ft. wide. P. A. H. Franklin has resigned as president and manager and the board of directors has chosen P. S. Merrill to succeed him. M. F. Murray, of Salt Lake, is assistant general manager.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—The shipments of copper bullion during the week ending February 9 aggregated about 180,000 lb.

Columbus Consolidated.—Plans are being drawn for a 100-ton concentrator, to be erected at Alta. Tony Jacobson, of Salt Lake, is manager.

United States Smelter.—The copper bullion shipments for the week ending February 1 aggregated 242,548 lb.

Utah Consolidated.—Shipments of copper bullion during the week ending February 19 amounted to 300,935 lb.

Utah Copper Co.—The new 500-ton concentrator at Bingham is ready and will go into commission as soon as two short railway spurs are finished.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Daly-Judge.—At the annual meeting the following directors were elected: John J. Daly, Moylan C. Fox and W. M. Bradley, of Salt Lake; Albert C. Wall, of Jersey City, and H. Otto Hanks, of Cincinnati. The receipts during 1903 amounted to $273,301. The year began with a cash balance on hand of $75,046, and ended with an overdraft of $38,940. The ore mined aggregated 46,143 tons. The crude sold for $14 per ton, net. The concentrates ran 28.72 oz. silver, .062 oz. gold, 43.91% lead and 7.4% zinc. The total amount of lead produced and sold was 7,397,592 lb.; silver, 273,301 oz., and 573.40 oz. gold.

Daly-West.—Receipts from ores in 1903 amounted to $2,382,258, an increase of $554,672 over the previous year, derived from the sale of 44,476 tons of crude ore from the Daly-West mine, 17,870 tons of crude from the Quincy mine, and 16,580 tons of concentrates. The Daly-West ores sold for $30.88 per ton. The Quincy crude ores sold for $23.32 per ton. The

concentrates sold for $35.73 per ton. The dividends amounted to $1,332,000, against $1,040,000 in 1902. The old board of directors, consisting of Jacob E. Bamberger, J. D. Wood, W. S. McCornick, W. H. Dickson and Ezra Thompson, was re-elected.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Honerine Mill.—This new plant at Buhl, near Stockton, will go in commission at once. About 450 tons of ore will be concentrated daily. The mill cost about $85,000.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Golden Eagle.—The shaft is down over 300 ft.

Hercules and Yukon.—These claims, 1½ miles south of Danville, at the north end of the county, have been sold to eastern men. An old shaft is being retimbered.

Ida Group.—A shaft is down 45 ft., following on a seam connected with the Quilp vein.

Lone Pine-Surprise Consolidated Gold Mining Co.—A meeting will be held at Spokane on March 15, to transfer the Last Chance claim to the Pearl Consolidated Mining Co., wind up all business, and disincorporate.

Morning Glory.—This mine is reported looking better than for a year.

Mountain Lion.—The stamps began crushing ore February 10 and work satisfactorily. The Huntington mills have not run smoothly, probably because of disuse and previous bad handling. A short run of the Hendryx agitator has shown that the mechanical part works well, but the results have not been made public. Some minor alterations in the mill will be made before it will be in shape to run steadily. A recent estimate is that there are about 33,000 tons of ore blocked out in the mine. About 4,000 tons are on the surface.

Nob Hill.—A boiler and a 2-drill compressor are being installed for driving on the vein, on the main tunnel level, and for driving a new tunnel to give 120 ft. additional depth.

Pearl Consolidated Mining Co.—The Lone Pine shaft is down 20 ft. The annual meeting will be held at Spokane on March 15.

Republic Ore Shipments.—The shipments from Republic camp to the smelters during the first half of February were: Mountain Lion, 670 tons; Quilp, 800 tons; Nob Hill, 360 tons.

Zala M.—The lessees expect soon to be shipping 60 tons of ore per week.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

The Transvaal Chamber of Mines reports the total production of the working mines for the month of January at 288,824 oz. fine gold, which compares with 199,279 oz. in January, 1903; showing an increase of 89,545 oz. this year.

ASIA.

INDIA-MYSORE.

Kolar Gold-Field.—The returns from this district for the month of January show a total gold production of 51,588 oz. bullion. This is 2,869 oz. less than in December, but 3,508 oz. more than in January, 1902. The bullion reported was equal to 46,429 oz. fine gold, or $959,687. The total production of the larger mines was as follows: Champion Reef, 18,012 oz.; Mysore, 16,726 oz.; Ooregum, 6,428 oz.; Nundydroog, 6,135 oz. bullion.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending February 13 shipments aggregated 15,884 tons, as follows: Granby, 10,590; Mother Lode, 3,040; Emma, 495; Senator, 264; Oro Denoro, 870; Athelstan-Jack Pot, 625; total for the year to date, 99,959 tons.

BRITISH COLUMBIA—NELSON DISTRICT.

(*From Our Special Correspondent.*)

Arlington.—During January the smelter returns were received from 244.5 tons of ore, amounting to $11,399. The expenses for the month were $4,682. The returns for November, December and January show a profit of $1,593.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending February 13 shipments amounted to 6,345 tons, as follows: Le Roi, 4,000; Centre Star, 930; War Eagle, 600; Kootenay, 50; Jumbo, 150; Le Roi No. 2, 200; Le Roi (milled), 340; White Bear, 75; year to date, 55,223 tons.

MINING STOCKS.

(Full quotations given on pages 345 and 346.)

New York, Feb. 24.

Dull and uncertain, with a tendency to weakness, describes the condition of the stock market. Trading is mostly professional on pool account, and with every fractional advance there is a sympathetic pressure to sell.

Amalgamated Copper was somewhat disturbed by the granting in the New York courts of a restraining order preventing the Boston & Montana Co. from disposing of any of its property. The disappointment in not getting the accumulated dividends a few days after the dismissal of the McGinnis injunction by the Montana Supreme Court broke the price of Amalgamated stock over 3 points to $44.875. Incidentally sales, governed apparently by interested operators, were normal. Anaconda lost 2 points, selling down to $15.50, but as it was seldom visible it attracted no special attention. On curb, Greene Consolidated of Mexico was influenced by the discord at recent meetings, and fell below par to $9.875. Later there was a recovery to $10.75. Rights to the new stock were sold at $10 to $3 per hundred. Payment for this new stock will be 50% when subscription is made, 25% in 30 days and 25% in 60 days. White Knob, of Idaho, held second place, breaking from $8.25 a few days ago to $5.75 on Tuesday. Explanation is that at the stockholders' meeting, on March 2, consideration will be given to the issue of $1,000,000 first mortgage 6% ten-year sinking fund gold bonds, convertible at par into stock. Half of this will be used in redeeming the existing bond issue of $500,000 and the balance for liquidating floating debts and for providing more working capital.

Ontario Silver, of Utah, made a sale at $4.75.

Contrary to expectation, Ophir, of Nevada, weakened from $5.10 to $4.50, although it paid another 25c. dividend to-day. Mexican receded from $2.10 to $1.80, as a result of an increased assessment. Consolidated California and Virginia lost 5c. at $1.65. Portland, of Cripple Creek, Colo., gains steadily in price, selling up to $1.90. Elkton moved at 64c. per share.

Boston. Feb. 23.

(*From Our Special Correspondent.*)

This market has been flat until to-day, when a selling movement caused prices to run off materially, in sympathy with the railroad shares. Up to to-day there has been but little pressure to sell stocks, and it is fair to assume that the selling was largely by the professional class for a time. Mining reports are coming to hand, and are encouraging to shareholders. At present speculation in mining shares is dormant, but it is expected that the spirit will move some day and more interest will be displayed in this class of securities.

Evidences appear to indicate that there has been some long selling of Copper Range Consolidated, which depressed the price to below $40. To-day it broke to $38 per share on moderate trading. Utah has been in demand from the same New York source, although the stock is off $1.12½ to $31.75 from a week back. There is very little trading in Parrot, with the last sale at $23.50. It closed to-night $22 bid, offered at $23.50. There is very little of this stock in the public's hands, but the demand for it has been notable since last Autumn.

Quincy Mining has lost $8 to $80, and Tamarack is off $2 to $100. Centennial is off a trifle to $17, Bingham to $19.25, Michigan to $4.50, Mohawk to $34.50 and Osceola is off $3.50 to $53.50. The annual meeting of the latter company is called for March 10, and the annual report will issue very shortly. Trinity is weak and around $46.25 on a report of consolidation with other companies. The truth of this report cannot be vouched for at the present time. Old Dominion made a spurt to $11.25, but has settled again. Contrary to reports there is no immediate likelihood of assessments being called by the Allouez or Adventure mining companies. The latter company has some $100,000 in hand. Elm River is selling freely at $2 and Wolverine is off to $70.

The annual report of the Franklin mine for 1903 shows receipts of $685,840, expenses $535,811, and total expenses, including $41,803 for construction $663,255, leaving a surplus of $22,585, against $49,694 for 1902. The average price received per pound was 13.5c., and the cost, including construction, was 12.3c. The annual report of the St. Mary's Mineral Land Company for 1903 shows $103,015 cash on hand, against $116,877 December 31, 1902. The company received $150,000 dividend money from its holdings of Champion mining stock, and paid out the same amount to its own stockholders. During 1903 the Champion mine produced 10,564,147 lb. fine copper from 388,918 tons of rock stamped.

Colorado Springs. Feb. 19.

(*From Our Special Correspondent.*)

The market on the local exchange during the past week has not been up to standard in activity, but prices have held up well, and the leaders, as a rule, show quotations fractionally higher than a week ago. The declaration of dividends by the El Paso, the C. K. & N. and the Old Gold companies has had a bracing effect on these stocks. El Paso was easily the feature of the trading, a large number of shares changing hands at prices ranging from 64½ to 67¾c. The stock of the new company formed by the consolidation of the Isabella and the Empire State companies was called for the first time to-day, the initial quotation being 37. Portland was unable to sustain the advance of last week, and declined from $2 to $1.80, recovering to $1.90.

The activity on Beacon hill and the recent discoveries of high-grade mineral there have made all Beacon hill stocks active and strong, and a heavy percentage of the trading has been done in shares of companies owning property in this locality. Ironclad hill and vicinity have also received considerable attention on account of the discovery of bonanza ore in the W. P. H. property a few weeks ago.

Salt Lake City. Feb. 20.

(*From Our Special Correspondent.*)

The week closed with the mining stock market in better tone, although the volume of business transacted was little above that of the previous week. Although Grand Central has returned to the dividend column, there was no demand for the stock at prevailing prices. Of the Park City stocks, Daly-Judge appeared the most active, and it was traded freely from $3.82 up to $4.22½, closing around the latter price. Consolidated Mercur made some gains. Of the Tintic stocks, Tetro has been the most sought. Star Consolidated dropped down to 16c., but later recovered somewhat. Utah, of the Fish Springs district, was called for and furnished at 53@53½c. Yankee Consolidated opened weak, but strengthened later.

San Francisco. Feb. 17.

(*From Our Special Correspondent.*)

The published returns from the Ophir and a pretty strong buying movement carried that stock up to $6 on Monday, with a subsequent reaction on Tuesday to $5.60, while to-day, after the declaration of a dividend, it dropped still further, selling at $4.65@$4.80. This gave a sort of tone to the other Comstocks, and trading was rather lively, but with a good deal of variation in prices. Thus, Mexican sold from $2.25 down to $1.90; Consolidated California & Virginia, however, was steadier, bringing $1.60@$1.70, while Sierra Nevada sold at 60c., and Gould & Curry at 45c. Ophir has

made the first excitement in the market we have had for a long time, and is being worked for all it is worth.

On the San Francisco & Tonopah Exchange business was more active than for some time past, and prices were pretty good. Montana Tonopah sold up to $1.40; Tonopah Belmont, 61c.; Tonopah Midway, 41c.; Rescue, 8c., at which price it was largely dealt in.

On the California Exchange business in oil stocks was rather dull, and prices were not strong. Reed Crude sold at $4.65; Monte Cristo, 80c.; Monarch, 41c., and California Standard, 12c. per share.

San Luis Potosi. Feb. 16.

(*From Our Special Correspondent.*)

Exchange on New York during the week dropped from 221.5 to 216. Mining stocks were weak. Victoria brought $145; Dos Estrellas, $1,825; Old Abe, $14; Amistad y Concordia, $81, and Cinco Señores, $60.

COAL TRADE REVIEW.

New York, Feb 24.

ANTHRACITE.

The anthracite trade shows more activity as a result of the very cold weather that has prevailed this month. Up to February 1 dealers at many points had what they thought was coal enough to last until spring. Since then they have changed their minds, and sales agents report a great increase in inquiries and orders. A short spell of warmer weather may have had some effect on retail buying, but has not affected wholesale trade, and will not affect retail buying materially, unless it lasts some days longer. The movement of coal from the mines, which has been greatly bothered by deep snows along the railroads, seems now in danger of sufferings from floods, but this danger will affect shipments to tidewater rather than to inland points. The shipments this month will be heavier than anticipated, and owing to the delays in transit the effects of the cold weather will be felt into March.

In the Northwest the movement of coal to inland points from docks has been as heavy as snow blockades will permit. Demand is very strong. It is already reported that some docks are running short of certain sizes, and the outlook is that in spite of the great tonnage in stock last fall supplies will be low, if not cleaned out, before navigation opens. Owing to the heavy ice on Lake Superior and Lake Michigan, navigation may open a month later than usual. In Chicago territory demand is, on the whole, brisk, and supplies in the hands of dealers have been reduced greatly since the first of the month. The movement of coal to country yards and arrivals of coal by all-rail have both suffered from the congested condition of the railroads due to the exceptional weather conditions. Along the lower lakes and in Canadian territory a few days of warmer weather allowed some coal to get to those Canadian points that had been in greatest need. The shortage, however, was so great that the tonnage forwarded gave little relief. All roads running into Canada are badly congested, both at Niagara Falls and at points farther east in New York. The congestion on the trunk lines is now, in fact, about as bad as it was at any time last winter. There is a great inquiry for coal in transit and traffic managers are weary of answering inquiries and complaints. At Atlantic seaboard points the trade outlook has much improved. Dealers in New England, especially, who, a few weeks ago, said they should want no coal before spring, are already in the market, and sales agents at New York are receiving more inquiries from that territory than at any time this winter. At New York harbor points a few days of milder weather have cleared the docks of ice, and permitted the loading of coal. The steam sizes continue in strong demand, and some sales agents are already talking of the possibility of a strike in the bituminous fields affecting this market.

Prices continue unchanged on the basis of $5 for egg, stove and nut sizes, and $4.75 for broken, f. o. b. New York harbor shipping port. Pea is $3.

BITUMINOUS.

The Atlantic seaboard bituminous trade shows an increased demand, caused chiefly by very slow rail transportation, but also to some extent by the fear of strikes. As regards transportation, it may be said that coal shipped from the mines as long ago as the last week in January has not yet reached tidewater, though it should have come through in less than a week. Complaints of such poor transportation are quite general. Consumers are getting short of coal. The conditions hitherto have been such that they could get coal as they wanted it and they have not increased stocks, consequently they are poorly prepared to meet present conditions. Consumers situated at points usually closed by ice are now running out of coal, on account of the unusually severe weather of the past few weeks, and are coming into the market. An influx of inquiries and orders from all directions is making market conditions worse.

Mine operators have met in an unofficial way recently, and are meeting from time to time, and sizing up the probable conditions they will have to meet this year. There does not seem to be an organized attempt to get operators to act together, and it is though probable that the operators in each district will try to work out their own problems without any general agreement. There is considerable talk of an endeavor to keep prices on the basis of $1.25 at the mines for Clearfield grades, but it is altogether likely that there will be more or less falling from grace in this regard. There is a rumor already that the Boston & Maine Railroad has contracted for several hundred thousand tons at less than $1 at the mines. The labor outlook in those fields, where the operators have agreements with the union, is still threatening. The men seem determined to stand out for the 1903 mining scales, while some operators intimate that they will pay such wages rather than have a strike, and others say positively that they will not. In any event it already is quite clear that the tonnage mined this year is going to be smaller than last year's output.

In the far East demand has increased, as stocks are considerably depleted. Inquiries are more numerous than for some time. It is probable that consumers who have been buying at below ordinary quotations are not able to get more coal from the poeple who have supplied them, on account of the bad transportation, and are coming into the market. Along Long Island sound there is a call for considerable coal, and consumers are only getting a portion of their wants. At New York harbor points demand is now active, and on account of delays to transportation some consumers have run out of supplies. All-rail trade continues brisk; shippers are receiving instructions from all points to have cars in transit traced, that consumers may get what coal is on the way, while additional shipments are wanted.

Transportation from mines to tidewater is very poor, as is the return of empties to the mines; as a result no one is able to calculate when any given order will be filled and reach its destination. Car supply is poor and very variable, some shippers report that they have been receiving less than 10% of their demands. In the coast-wise vessel market Baltimore and Philadelphia are still closed by ice. Current quotations from Norfolk, Newport News and New York harbor are about 90c.@$1 to Long Island sound points, and $1.10 to points beyond Cape Cod.

Birmingham. Feb. 22.

(*From Our Special Correspondent.*)

Coal mine operations in Alabama have been quite steady lately, and the production heavy. There is a good demand for the product and the prices which prevail are quite satisfactory. The Pratt and Globe coal companies, which own extensive properties in the western part of Jefferson county, are putting in expensive hauling machinery in their mines looking to a large production. The Tennessee Coal, Iron & Railroad Co., so it is stated, is considering an electrical haulage system for No. 4 mines, located near Ensley, in the Birmingham district, similar to the system in Mine No. 3, near Pratt City. It is believed that a haulage system can be placed in Mine No. 4 at an expense of not more than $10,000 to $15,000, and this expenditure will be repaid in a short while by a larger production. The Galloway Coal & Coke Co. has pushed developments in the vicinity of Carbon Hill, in Walker county, and will be ready in the next few days to begin a daily production in two new mines. The mines at Carbon Hill are equipped with coal mining machinery. The miners and mine workers employed in Carbon Hill and throughout the better part of Walker county do not belong to the United Mine Workers of America, but have a separate contract, expiring about March 31. It is believed that a new contract will be made with these miners without trouble.

Mr. J. M. Meighan, who has secured the contract for the first 150 coke ovens to be built for the Sayre Mining & Manufacturing Co., in the western part of Jefferson county, has started a large force of hands at work on the job. It is expected that an additional 150 coke ovens will be built by the same company before the first 150 have been completed.

The Cranford Coal Co. has been organized at Jasper, Walker county, with J. H. Cranford, president and treasurer; John Dodd, vice-president, and W. E. Brinkerhoff, secretary and manager of mines. The company is incorporated with $15,000 capital, and the properties of the Parlor Coal Company in Winston county are taken over and will be worked.

Chicago. Feb. 22.

(*From Our Special Correspondent.*)

Sales of anthracite continue heavy under the stimulus to the trade given by prolonged cold weather all over Chicago territory. There is, of course, a large supply in dock yards, and all-rail demands are not so great, relatively, as in former years. But the all-rail orders are by no means small, and there is much complaint about delays in shipments by all-rail. To all appearances, the trade will have a prosperous time from now until the certain opening of spring. The car price of anthracite continues unchanged—$6.50 for stove, egg and chestnut, with the practical certainty now that there will be no change until the opening of navigation on the lakes. Even the coming of mild weather soon will not injure the present good trade in anthracite, for the reason that stocks of consumers and retailers are apparently exhausted and there must be continued buying for the needs of consumers.

The bituminous market is not in so good a condition for wholesalers as the anthracite. Transportation troubles have been annoying, but not really serious to the trade as a whole. The demand has been especially good for Hocking, which continues to bring $3.40@$4, with the call greatest for the best grades. There has also been a good market for run-of-mine and screenings from Indiana and Illinois mines, the former brinigng $1.80@$2.10, and the latter $1.60@$1.75. Smokeless is down again, sales having been made as low as $3, though most of it—Pocahontas, New River and other West Virginia kinds—sells at $3.40@$3.60. Gas coals are in demand, and Youghiogheny especially so. Youghiogheny is quoted at $3.25. Cannel and smelting continue good sellers.

In general, there seems less demand for Eastern coals in Chicago territory this winter than formerly—except gas coals—and the market for Western would be a very good one were it not for overproduction, which is not yet regulated.

Cleveland. Feb. 23.

(*From Our Special Correspondent.*)

The demand for coal of all sorts in the Cleveland territory is now much better than the supply. The improvement in the situation arises from a couple of causes. One of them is an increase in the consumption, and the other is a slackening of the supply through a shortage of cars, which is coming to be more and more serious. The congestion in the railroad situation has been increased, despite the embargoes placed by the railroads against all classes of material from foreign lines except live stock and perishable goods.

The demand for steam coal seems to have been much improved by the opening of some new factories and other business concerns consuming

large quantities of coal. The receipts of steam coal in this territory have not been quite as good as they might have been. Pittsburg coal is worth $1.10@$1.20 at mine, while Ohio coal is bringing $1.10@$1.15 per ton.

The demand for domestic coal has been steady, the cold weather and the uncertainty of the gas supply making the need for fuel urgent. Massillon coal is bringing $2.80 at the mines.

The coke situation is a little stronger. Prices have held about as they were. Good 72-hour coke is worth $2.25@$2.50 at the furnace, while high sulphur cokes are bringing $2@$2.15 per ton.

Pittsburg. Feb. 23.

(From Our Special Correspondent.)

Coal.—It has just been developed that the special convention of the United Mine Workers called for next Monday at Indianapolis will be more important than was at first given out. The call is for the entire organization, and not the four States parties to the inter-State agreement. It is reported that at the conference of the special committee on Monday of last week the operators made a compromise proposition on the scale for the four States, which can only be accepted by consent of the entire organization, including the miners in the anthracite field, whose scale will not expire for two years, and other States which have annual agreements that run until late in the present year. The scale for the four States—Pennsylvania, Ohio, Indiana and Illinois—expires on March 31. It is reported that the operators propose to make an agreement covering a period of two years from April 1. They will offer to pay the scale of 1902, based on an 80c. rate for pick mining, for the year beginning on April 1 this year, and for the following year will pay the scale of 1903, which is based on a pick mining rate of 90c. No effort is being made to obtain any new business and many of the mines are idle. Prices are firm, run-of-mine being quoted at $1.20@$1.30. There are about 15,000,000 bush. of coal loaded in the pools and harbor, ready to go out as soon as the rivers are navigable.

The new board of directors of the Pittsburg Coal Co. met here on Friday and organized by electing officers as follows: Francis L. Robbins, chairman and president; M. H. Taylor, of Erie, first vice-president; W. R. Woodford, of Pittsburg, second vice-president; L. R. Doty, of Chicago, third vice-president; F. M. Wallace, of Erie, treasurer; W. Hamilton Brunt, assistant treasurer; F. J. LeMoyne, secretary, and J. L. B. Hornberger, comptroller. John D. Nicholson, former first vice-president and treasurer, retired and these offices were separated and the office of comptroller was created. A finance committee also was created at the meeting and is composed of F. L. Robbins, M. H. Taylor, A. W. Mellon, George T. Oliver and John A. Bell. A call was issued for the reconvening of the adjourned annual meeting of the company. It will be held on March 2 at Jersey City, when the proposed amendment to the certificate of incorporation will be voted upon.

Connellsville Coke.—Despite the poor supply of railroad cars, the shipments show an increase and production also was greater. Prices of standard Connellsville furnace coke remain at $1.60 on contract, although sales for prompt delivery are reported at a lower figure. Foundry coke is still quoted at $2@$2.25. The *Courier* in its last issue gives the production for the previous week at 208,916 tons, a gain of nearly 2,000 tons. The shipments for the week aggregated 8,415 cars, an increase of 878 cars, distributed as follows: To Pittsburg and river tipples, 3,180 cars; to points west of Pittsburg, 3,945 cars; to points east of Everson, 1,290 cars.

San Francisco. Feb. 18.

(From Our Special Correspondent.)

The circular of Mr. J. W. Harrison, dated February 13, says: "There has been recently only one cargo, 3,200 tons coal, from Australia. There are five cargoes now afloat bound for this port, and there are in all 14 cargoes, including the five now en route, engaged to transport coal here; the total carrying capacity being about 35,000 tons. The quantity of colonial coal here in yard is very light; it consists principally of coal suitable for house uses. The coal required for steam purposes is being freely delivered from the British Columbia collieries at prices with which the Newcastle collieries cannot compete, as the freight on coal from Newcastle to San Francisco is fully double what is asked for the same service from British Columbia, hence if the colonial mine-owners are solicitous to retain their trade here they will be forced to reduce their figures materially below their present asking prices. The war between Russia and Japan, now commenced, will not in any way affect the coal trade on this side, so long as no other nations shall become involved. The output of fuel oil is still further increasing, and prices remain steady. The Government transports returning from the Philippines have recently been loading coal at Japanese ports, as they have had but little freight and few passengers returning here."

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Feb. 24.

Export trade here continues very quiet, with little new business reported.

Exports of fuel from Great Britain for the month of January are reported as follows, in long tons:

	1903.	1904.	Changes.
Coal	3,568,892	3,262,364	D. 306,528
Coke	62,096	54,740	D. 7,356
Briquettes	52,476	108,729	I. 56,253
Total	3,683,464	3,425,833	D. 257,631

Shipments of coal abroad for steamships engaged in foreign trade—not included above—were 1,321,789 tons, against 1,345,638 tons in January of last year.

Exports of British coal to the United States in January are reported as follows, in long tons:

	1903.	1904.	Changes.
Atlantic ports	....	5,523	I. 5,523
Pacific ports	5,832	13,084	I. 7,252
Total	5,832	18,607	I. 12,775

No shipments to Atlantic ports were reported in January of last year.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of February 13, that the best large coal is firmer, but otherwise there is not much change. Quotations are: Best Welsh steam coal, $3.84; seconds, $3.60; thirds, $3.36; dry coals, $3.60; best Monmouthshire, $3.36; seconds, $3.26; best small steam coal, $1.98; seconds, $1.86; other sorts, $1.56.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market is firmer all round, and tonnage scarce. Some rates quoted from Cardiff are: Marseilles, $1.30; Genoa, $1.50; Naples, $1.44; Singapore, $2.52; Las Palmas, $1.38; St. Vincent, $1.56; Rio, $2.16; Santos, $2.52; Buenos Aires, $1.74.

IRON TRADE REVIEW.

New York, Feb. 24.

The iron trade continues to show a varied and, on some points, a perplexing outlook. The demand for raw material seems to be improving slightly, nevertheless, prices are not strong, and pig iron has been sold at rather lower figures. The Southern furnaces have given way to the demands of buyers, and No. 2 foundry is being placed at $9.50 Birmingham. Most of the business done has been in foundry and forge pig, the market for bessemer and basic being apparently quite dead. Reports that the United States Steel Corporation was negotiating for a lot of outside iron are contradicted, and it is pretty evident that, for a time at least, the corporation will rely upon its own furnaces for all necessary supplies.

In finished material the market is mixed. There has been some business in bars and sheets and a little in plates; but in other lines matters have been very quiet indeed. There has been talk of bridge orders, but they have not materialized. The expected business from Baltimore has hardly made its appearance yet, though a few scattering orders for structural steel have been placed. They do not amount to enough, however, to make any material difference.

It looks very much as though the railroads had given up hopes of a reduction in the price of steel rails. A few orders have been placed, and it is said that more are coming. Furthermore, notice has been given that the reduction on export trade rates will be withdrawn probably not later than July.

British Iron Trade.—Exports of iron and steel from Great Britain in January are valued by the Board of Trade returns at £2,317,842, a decrease of £84,395 from last year. Among the principal items of exports this year were 59,076 tons of pig iron, 10,202 tons of bars, 63,081 tons of rails and 30,516 tons of sheets.

Imports of iron ore in January were 483,992 tons, of which 377,191 tons were from Spain; the total shows a decrease of 128,011 tons from January last year.

Birmingham. Feb. 22.

(From Our Special Correspondent.)

The Alabama pig iron market continues quiet, though prices are low, as was mentioned heretofore. The competition of northern iron manufacturers was more than the Southern producers could stand and the cut in prices had to follow. It is freely admitted that No. 2 foundry is selling at $9.50 per ton, and even that price, according to rumor, is being discounted. The shipments of iron are heavy and steady, but on orders obtained some time ago. The orders which are being received now are in small lots. There is very little iron sold for delivery during the second quarter of the year. The Sloss-Sheffield Steel & Iron Co. announced on Saturday that though the market is slow and the purchasing in small lots, that the aggregate business done for the week was about equal to the production. This company has six of its seven furnaces in operation. Other companies in this district are selling about their make at the reduced prices.

The production in Alabama has been improved by the blowing in of No. 3 furnace of the Republic Iron & Steel Co. at Thomas, during the past week. The furnace has been thoroughly repaired and should manufacture 300 tons of iron daily. No. 1 furnace, at the same place, will be ready for the torch before the middle of next month.

Foundry and machine shop men report no change in conditions, there being room for improvement in that line.

There is steady operation at the steel plant of the Tennessee Coal, Iron & Railroad Co. at Ensley. The new converter and mixer at this big plant were started up during the past week. The steel plant is working on several good orders for rails; recently another large order was received for that product, deliveries to commence in the near future.

The following pig iron quotations are given: No. 1 foundry, $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.50@$8.75; gray forge, $8.50@$8.75; No. 1 soft, $10; No. 2 soft, $9.50.

The experts appointed for the purpose of investigating values of coal and ore properties of the Tennessee, the Sloss-Sheffield and the Republic companies, have been pushing their work the last week, visiting coal properties belonging to the Tennessee Company in the State of Tennessee. Industrial folks in this section do not believe that the deal will go through.

Chicago. Feb. 22.

(From Our Special Correspondent.)

Sales of pig iron have been somewhat better in the last week than in the previous week, though the market cannot be said to be greatly changed. Compared with a month or two months ago, however, an upward tendency is manifest, and there can be little doubt that the market is slowly but surely getting a healthier

tone. Week by week, however, there is a fluctuation due apparently to varying local demands, that keeps selling agents alternating between hope and fear. One thing is clear—the consumer will not for an indefinite time to come buy as far ahead as he used to buy. He has lengthened out the time between orders and deliveries over what it was six months ago, but he has by no means made it so long—nor does he seem likely to make it so long—as a year ago.

A few large orders are being placed, but in general the trade is in small lots. Southern is the chief seller at $9.50 Birmingham, or $13.35 Chicago. Northern is practically the same, quotations for No. 2 being $13.50 minimum. The demand for northern seems to be confined, as heretofore, to the need for mixtures. With so many Northern furnaces out of blast in the Chicago district the local demand for Northern seems likely soon to catch up with the output, before Southern settles to a solid basis. Coke is somewhat firmer, and brings $4.90@$5. Shipments have been restricted and delayed, but there is plenty to be had.

Cleveland. Feb. 23.

(*From Our Special Correspondent.*)

Iron Ore.—It is now almost certain there will be little or no contracting with vessel firms for the transportation of iron ore during the coming season of navigation. The prospective curtailment of the output of ore will make that unnecessary and impossible. The fleets owned by the shippers who consume their own product will be able to carry about 14,000,000 tons. If the original estimate is not exceeded, the fleets owned by the producers and consumers will be able to carry all that is produced. Otherwise the amount which is to be brought down will not be enough in excess of the capacity of the corporation-owned fleets to make it worth while to enter contracts. Going rates only will be charged, and the situation does not promise any very brilliant prospects for the merchant ships. It is now said that the going rate at the opening will not exceed 75c., and possibly not 70c., from the head of the lakes to Ohio ports.

Pig Iron.—The consumption of pig iron for the present is somewhat heavier than it has been for several months. The steady increase in the activity along the lines of finished steel has helped the independent pig iron producers considerably. This has helped to stiffen the prices, although the market is still weak and sagging. Northern furnaces are holding for $12.50 in the valleys for No. 2, and southern stacks are holding for $10, Birmingham. This leaves most of the material for the stacks of this territory, the situation being such that southern producers cannot hope to compete in this field. The other side of the market is dull and listless. No inquiries for bessemer or basic have been received, and that material is hardly mentioned.

Finished Material.—The independent producers of sheet are again trying to get together on a basis of prices that will permit them to control their market better than they have been doing. Recent cutting of rates has resulted in losses to some of the smaller concerns, and they have sought to stop the loss. This has resulted in an effort to get all of the smaller mills to agree upon a list of prices that will be recognized. The association mills have been holding for their prices regardless of the cut. The present action, therefore, merely takes from the market its disturbing factor, leaving the market free. The old price of 2.50c. for No. 27 black sheets out of stock as a basis is still being quoted.

The producers of bar iron are finding that the present cost of scrap makes it impossible for them to make any money at existing prices. They are trying to get 1.30c., Youngstown, or as near to that as local conditions of competition will permit. The result is that very little business is being done. The market for bar steel seems to pick up somewhat. Cuts have been heard of in the billet trade of $1 to $2 a ton, Cleveland delivery. This market does not seem to have gained any strength with the reduction, the change amounting only to a shifting of the activity from the larger to the smaller mills. The quotation for Bessemer is $22@$23.50.

New York. Feb. 24.

Pig Iron.—Inquiries are more numerous, Southern irons are lower again. We quote as follows: No. 1 X foundry, $15.50@15.75; No. 2 X, $14.75@15; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.75. For southern irons on dock quotations are: No. 1 foundry, $13.75; No. 2 foundry, $13.25; with lower grades in proportion. No. 1 soft can be had at about $13.75, and No. 2 soft at $13.25.

Bar Iron and Steel.—Business is light. Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.30c.

Plates.—There is no improvement in demand over last week. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight.

Structural Material.—The local market is quiet and demand is slack. Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. Feb. 24.

(*From Our Special Correspondent.*)

Pig Iron.—The only transactions of importance during the past few days have been confined to No. 2 foundry and basic, which were purchased by consumers throughout eastern Pennsylvania, and by some in New Jersey. We have reports to-day of some transactions in central Pennsylvania of considerable magnitude. For some time past there have been rumors of heavy transactions in basic iron, but upon close investigation it narrows down to the fact that inquiries for large amounts were made; the basic sales of the past week show that these inquiries are now resulting in business. The furnace price for basic is $13. A good deal of trouble has been made by offerings of No. 2 southern foundry to consumers in this territory, and some of our local agents say their plans for business have been set all awry.

Quotations are more unreliable to-day than usual. No. 1 X foundry is quoted at $16 for the better grades and $15 for the better grades of No. 2, though sales in both kinds have been made at 50c. less. No. 2 plain is worth about $14; southern iron was offered to-day, rail shipment, at $13.50; water shipment, $13; standard gray forge is quoted strong at $13.50@$14; basic is nominally $14, but whatever business has been done has been at less.

Billets.—The only difference in billets over last week is in the number of small sales that have been made. The best quotation given to-day is $24.50 delivered. The adjustment which has been announced as an advance has resulted in a slight improvement in the retail demand. The present quotation is: For common, 1.35; for refined, 1.44½, delivered. Stores are selling from 1.75 to 1.90.

Sheets.—Where prompt deliveries are demanded our mill people claim they are getting a little more than card rates. The few large consumers who have placed orders this week secured the same concessions from current rates as they secured two months ago.

Merchant Pipe.—The encouraging feature of this branch of the iron trade is in the increasing number of small orders.

Tubes.—All kinds of tubes are selling quite freely, but the inducements offered by manufacturers for car-load lots are not being accepted by our people.

Cast Pipe.—There is a good deal of activity among municipalities in the purchase of cast-iron pipe, and the representatives of our largest plants here report a continuous inquiry which is very gratifying.

Plates.—For some weeks past the most of our business has been confined to tank and boiler plate. Plates are quoted at 1.73½ in car-load lots for ¼-in.; for Nos. 7 and 8, 1.88½; for boiler steel, 1.83½; locomotive fire-box, 2.23½. The business is decidedly better than 30 days ago.

Structural Material.—Some of the expected Baltimore business has come in, amounting to a few hundred tons of material, which comes as a 'hurry' job. Quotations for beams, angles and channels range from 1.73½ to 1.85.

Old Rails.—The handlers of old rails have urgent requirements from their customers, particularly for old iron rails, and a limited business was done this week on a basis of $15.25.

Scrap.—Quite a number of buyers of scrap have succeeded during the past few days in obtaining moderate quantities, particularly of country scrap, which was secured at $14.50; machinery scrap was bought at $13, and heavy steel scrap commanded about the same figure.

Pittsburg. Feb. 23.

(*From Our Special Correspondent.*)

There is no improvement in the pig iron market and indications point to still lower prices. Sales are confined to small lots for early delivery, and while there have been rumors that the United States Steel Corporation is about to place a large order, there has been no grounds for them. The corporation will undoubtedly be able to produce all the iron it requires this year unless there is a remarkable improvement in the iron and steel trade. Furnace C, of the Edgar Thomson group at Braddock, owned by the Carnegie Steel Co., was put in blast on Sunday, after extensive improvements costing about $200,000. This is the last of the 11 furnaces in the group to be started. The corporation, likely, will be operating all of its furnaces by April 1. Ore prices are expected to be considerably lower, but the opinion is expresed here that there will be no agreement on Lake Superior ores. Others believe the interests will get together and fix a price at from only 25c. or 50c. lower than last season. The furnaces in the Pittsburg and Valley districts would not get the benefit of lower prices until the large stocks of ore bought at last year's prices are exhausted. Some have stocks that will keep them well supplied until August. While there is but little demand for bessemer and foundry iron, there have been large inquiries for basic pig, one being for 10,000 tons. Furnaces are not making the concessions desired, and so far there has been no sales of importance.

The demand for pipe, wire products and steel bars continues, but the market in other lines is a trifle weaker. Prices of all finished products remain firm. Higher prices are expected to rule in the leading lines. The steel bar men are likely to order an advance at any time, and this has stimulated buying. During the past ten days agricultural implement manufacturers have placed orders aggregating about 50,000 tons. At the meeting of steel bar interests last week some urged an advance, to become effective early in the month of March, and that notice to that effect be sent out at once. There was quite a strong feeling for an increase of from $1 to $2 a ton. It was decided to defer action, and when an advance is ordered buyers will not be given time to cover at the old prices as was done last time. The Pittsburg Steel Co., which took the lead in advancing wire prices, may engage in the tube business. The principal owners are named in an application to be made for a Pennsylvania charter for the Seamless Tube Co. of America. The new company proposes to erect a pipe mill at Monessen, adjoining the works of the Pittsburg Steel Co. Iron bars also have improved, and it is impossible now to do better than 1.30c., Youngstown. An advance of at least $1 a ton is likely to be ordered at any time. The sheet and structural material markets are dull this week, but are expected to improve before long. The extreme cold weather has crippled the railroads and transportation facilities have been very bad. This has had an effect on the iron and steel trade. The railroads have decided to take off the special export freight rates on all iron and steel products August 1, and there is now no doubt that steel rail prices will remain at $28. It is reported that two railroad systems are negotiating for 125,000 tons of rails, and the contracts are expected to be closed this week.

The tin-plate industry is rather complicated and union independent concerns are endeavoring to get concessions from the Amalgamated Association of Iron, Steel & Tin Workers. In addition to the non-union plants of the American Sheet & Tin-Plate Co. there is one large independent company operating on a non-union

basis and paying its men about 28 per cent. less than the Amalgamated scale. The Alcania Tin-Plate Co. has made an arrangement with its employees, whereby they leave 25% of their earnings to be paid in six months, if the profits warrant, after regular charges for repairs, maintenance, depreciation and 5% interest on the investment have been deducted. The McClure Tin-Plate Co., operating a plant at Washington, near Pittsburg, proposed a straight reduction to the men, which was refused, and the works were promptly shut down. The company proposes to keep the plant idle until July 1, when it is believed all the works of the leading interest will be closed and tin-plate workers will be ready to return at almost any wage scale. The American Co. will have a large stock of standard sizes of tin-plate and can afford to close its union plants for an indefinite period. As the corporation will only be able to supply standard sizes, and with its non-union plants cannot take care of the demand for special sizes and for terne plate, independent producers expect to make some money, as prices are bound to advance.

Pig Iron.—Sales of all grades of pig iron were confined to small lots. Bessemer is still quoted at $12.75@$13, Valley furnaces. Foundry No. 2 is down to $13, Pittsburg, and gray forge remains at $12.75@$13, Pittsburg.

Steel.—The market is firm, but few sales of bessemer or open-hearth billets were made. Members of the pool are maintaining the price of $23. Steel bars are firm at 1.30c. and plates at 1.60c.

Sheets.—Business is increasing as the spring trade is opening up and prices are not being shaded. No. 28 gauge black sheets continue to be quoted at 2.30c. and galvanized at 3.30c.

Ferro-manganese.—The market is a trifle weaker, and 80% domestic is quoted at $43.50@$44.50 per ton.

Cartagena, Spain. Feb. 6.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Exports for the week were one cargo, 2,200 tons manganiferous ores and one cargo, 1,300 tons dry ore, both to Great Britain. The market has been more active, and a few contracts are reported for forward delivery, with several sales of odd cargoes for prompt shipment. Freight rates are very low, February loading being quoted 5s. 9d. to Glasgow and 6s. 3d. to Maryport. The shipping strike is at an end.

Quotations for ordinary 50% ores are 6s. 6d. @6s. 9d., with 6d. more for low phosphorus ores. Specular 58% ore is quoted at 9s.; magnetic ore, 60%, 11s. 3d. for lump and 9s. 3d. for smalls. Manganiferous ores range from 9s. 6d. for 12% manganese and 35% iron up to 14s. 3d. for 20% manganese and 20% iron.

Pyrites.—Iron pyrites, 43% sulphur and 40% iron, are quoted at 10s. 3d. per ton. No shipments for the week.

CHEMICALS AND MINERALS.

New York, Feb. 24.

Few large purchases are reported this week, and the interference with transportation on land and water has given the market a very quiet aspect.

With some surprise holders of common stock in the General Chemical Co. have learned officially that no dividend will be paid in 1904. The action, says President Nichols, was taken in a spirit of conservatism, in accordance with the small addition made to the surplus last year, owing to a sudden depression in business, and some serious losses by fire and flood. In 1903 the common shareholders received dividends of 5%, which was an increase of 1% over 1902, and made 17% since 1900, the first payment. No change has occurred in the 6% preferred dividend; adding the 1½% for the first quarter this year, these shares have yielded 25.5%. At the annual meeting at Phillipstown, N. Y., recently all the officers and directors were re-elected.

According to report the Solvay Process Co. at Delray, Mich., has bought from Swift & Co. the modern 40-ton Lincoln salt plant and 20 acres of adjoining land for $115,000.

The Roessler & Hasslacher Chemical Co. has been appointed selling agents in New York, Boston, Chicago, Cincinnati and Kansas City, for the anhydrous and aqua ammonia made by the Ammonia Co., of Philadelphia.

The Lipari Island pumice stone agreement has had a setback. It appears that the municipality holds land as a gift which can be worked only by the inhabitants of the islands, according to agreement. This technicality is worrying the Germans, who are promoting the combination, and unless the municipality agrees to lease the city land to the foreigners the monopoly will be incomplete and probably short-lived.

The paint industry in Canada is experiencing keen competition, and reports from Toronto state that white lead has been bid down from $4.75 per 100 lb. to $4.50. It is intimated that this cut in price has been initiated by the late heavy speculative purchases by retailers. Present quotations are on a par with the American. Barytes mixed with machine oil, a substitute for putty, has had a large sale in Canada, but consumers finding the goods of inferior quality are now demanding the guaranteed article.

Now East Africa is reported to have a large lake rich in sodium carbonate, 88 miles from Kiu, on the Uganda railway. Ten years ago Cape Colony exposed very rich beds of potassium nitrate, 140 miles from De Aar. These are parallel instances where transportation costs play a most important part in the development of rich mineral deposits. The potassium nitrate beds have still to be opened on a commercial scale.

Cyanide.—Little interest is shown in this market, and sellers quote prices nominal at 19.5@20c. per lb.

Bleaching Powder.—An interesting fact is that last month 78% of the British exports were made to America, whereas a year ago the ratio was only 63%, indicating a healthy increase in this quarter at the sacrifice of other markets. Equally noteworthy is the knowledge that this year's shipments to the United States have been made an average f. o. b. price in England of 78c. per 100 lb., or 3c. less than 1903. Momentarily prime British bleach is quoted in New York at $1.25 per 100 lb., same as domestic, while Continental rules at $1.20@$1.25. Small re-sales, ex-dock, are reported at $1.10@$1.125.

Copper Sulphate.—Re-sales at $5 per 100 lb. in New York are more frequent, but makers continue to quote contracts at $5.05@$5.10. Importers recently received a new supply from Great Britain, and notwithstanding the duty, quote on a par with domestic producers. Exports from Great Britain to all countries in January amounted to 3,823 long tons, being an increase over 1903, and having an average f. o. b. England price of $4.46 per 100 lb.

Acids.—Contract deliveries are fairly good. Last month Great Britain exported 1,079,672 lb. sulphuric acid.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.50	bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23 00
Nitric, 42°	5.50		

Brimstone.—Extremely quiet. Odd lots of best unmixed seconds on spot sold at $22.75@$23 per ton. Shipments are quoted at $22@$22.25. Best thirds are nominally 50c. less than seconds. In January Great Britain imported 1,388 tons, as against 1,798 tons a year ago.

Pyrites.—Sellers look hopeful as the South has caught the cotton planting fever. Calculations are that the consumption of pyrites for fertilizer acid manufacture this year will show an improvement over 1903. Domestic ore is easier in price. There is consternation among domestic shippers as certain railroads are making preferential rates with importers. Instances are cited where Southern shippers to the Central West are paying a much higher rail rate than is given as the all-round schedule from Spain to the same territory. True, considerably more foreign ore is shipped over these roads, but domestic producers claim they are handicapped by the excessive freight rates. Imports at New York this week were 11,041 metric tons Spanish iron pyrites.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Quiet at $2.15@$2.175 per 100 lb. for spot at New York and $2.10@$2.125 at Philadelphia and Baltimore. Futures from March to December are quoted at $2.10@$2.05. Abroad the unstable prices for beet-sugar have cast a shadow over the nitrate of soda market. There is some speculation as regards the statistical position, and certain people believe there will be a shortage before the European buying season is over. Last year the deliveries from February to April inclusive were 593,470 tons.

Chilean Nitrate of Soda Market.—Messrs. Jackson Bros., of Valparaiso, write under date of January 9 that exporters have abstained from operating, the few sales made having been to complete cargoes. Although producers ask 7s. 2d. for 95% alongside January-February delivery, there are several re-sellers at 7s. 1½d. Refined is scarce for January-March delivery, and we know of only one parcel offered at 7s. 6d. alongside. Exports for the year 1903 are cabled as 31,747,000 qtls., showing quite an increase over 1902. We quote 95%, January, 7s. 1d.; February, 7s. ½d.; March, 6s. 11½d.; April-December, 6s. 9d.; and 96%, January-February, 7s. 5½d.; July-December, 6s. 11d. @6s. 11½d.; all ordinary terms, sellers. The price of 7s. 1d. with an all-round freight of 15s. stands in 8s. 7½d. per cwt., net cost and freight, without purchasing commission.

Sulphate of Ammonia.—Evidently the South, in anticipation of an increased planting this year, is laying in good quantities of fertilizers. Recently purchasers of gas liquor sulphate of ammonia have been made at $3.175@$3.20 per 100 lb. Agriculturists are said to be agitating a reduction or elimination of the import duty of 0.03c. per lb. on imported sulphate of ammonia, of which about 80% is used in the manufacture of artificial fertilizers. Congress is asked to pass a special bill to that effect. Of course opposition will be shown by domestic producers of sulphate of ammonia, particularly by the by-product coke people.

Phosphates.—Attention is turning to the spring trade, which usually takes for export over 250,000 tons. Prices at mine are unchanged, but abroad they have eased off somewhat, not enough, though to fall below last year's average. Fortunately there is still a difference in ocean freight rates, as compared to 1903, but exporters fear the situation may change at any moment, owing to the Oriental war.

Again the inquiry is made, why do we export annually over 785,000 tons phosphates, comprising nearly all the Florida hard rock, and a large part of the land pebble and Tennessee rock produced when we have facilities for manufacturing high grade superphosphates at comparatively little cost. It has been suggested that a propaganda should be started to encourage the manufacture of sulphuric acid for superphosphate making at points where fumes from zinc and copper smelters are destroying useful vegetation and causing other inconveniences that are known to have ended in costly litigation. Large quantities of acid are already being made as a by-product in the metallurgy of zinc and copper in Illinois and elsewhere, apparently at a profit. Usually the acid is of a grade best suited for the preparation of fertilizers, and finds a ready market for this purpose. It is worthy of note that the United States is one of the largest consumers of fertilizers in the world, and in recent years the demand for superphosphates, etc., has grown enormously. With cheap acid and a resulting increased output of superphosphates, there is reason to expect a regular export trade, particularly with France and Germany, countries that have already tried with success some of the Tennessee manufacture.

Current ocean freight rates are about as follows:

	Shipping ports			
	Florida.	So. Carolina.	Algeria.	
Baltic	$3.24@$3.36	$2.26	....	....
Continental	2.76@ 3.00	....	2.16@	2.22
Mediterranean	3.36@ 3.60	....	....	....
United Kingdom	2.64@ 3.12	2.40@ 2.52	1.56@	1.68

Prices for phosphates per ton are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@ 80%...	$6.50@ 7.00	$9.84@$10.83
land pebble, 68@73%..	3.75@ 4.00	7.35@ 8.05
†Tenn, 78@80%.....	4.00@ 4.25	9.54@ 10.56
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.25	.....
river rock, 55@60%.	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	6.98@ 7.65
58@63%	.....	6.20@ 6.66
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.05@ 6.65
Christmas Isle, 80@85%.....	.....	11.75@ 12.54
Ocean Isle, 82@88%.....	.....	12.11@ 13,60
Somme, Fr., 70@75%.....	.....	10.63@ 10.77
Bordeaux, Fr., 60@65%.....	.....	7.60@ 7.71
55@60%.....	.....	6.44@ 6.55
Liege, Bel., 60@65%...	.....	7.07@ 7.17

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. Feb. 10.

(*Special Report of Joseph P. Brunner & Co.*)

Business generally is very quiet. Exports of bleaching materials and sodas for January, as taken from the Board of Trade returns, were: Bleaching materials: To United States, 69,603 cwts.; other countries, 19,593 cwts.; total 89,196 cwts. Soda ash, 125,765 cwts.; bicarbonate soda, 24,988; caustic soda, 88,391; soda crystals, 13,112 cwts.; salt cake, 79,391 cwts.; other sorts, 25,138 cwts.; total, 356,785 cwts.

Soda ash is well controlled by makers. For tierces, nearest range for any position, is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@ £4 15s., net cash; bags, 5s. per ton under price for tierces. Soda crystals are in fair jobbing demand at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in moderate request, but prices are firm: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters. Bleaching powder is idle on spot and for hardwood prices are nominal at about £4 5s.@ £4 10s. per ton, net cash, as to market. Chlorate of potash is still very slow of sale and prices are nominal at about 2⅜d.@2½d. per lb., net cash for English make. Bicarbonate of soda is firm at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets. Sulphate of ammonia is in limited demand and easier at £12 17s. 6d@£13 per ton, less 2½% for good gray, 24@25% in double bags, f. o. b. here.

METAL MARKET.

New York, Feb. 24.

Gold and Silver Exports and Imports,

At all United States Ports in January and Year.

Metal	January.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$85,951	$591,567	$85,951	$591,567
Imports.	2,010,851	8,225,508	2,010,851	8,225,508
Excess	I. $1,924,900	I. $7,633,941	I. $1,924,900	I. $7,633,941
Silver:				
Exports.	3,577,881	4,618,127	3,577,881	4,618,127
Imports.	1,494,556	2,609,372	1,494,556	2,609,372
Excess	E. $2,083,325	E. $2,008,755	E. $2,083,325	E. $2,008,755

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending February 20 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$1,000	$22,895	$864,362	$1,017
1904.....	1,044,297	1,250,080	6,413,442	161,753
1903.....	284,278	673,248	2,775,403	126,713
1902.....	6,253,530	278,769	5,713,232	189,286

The figures for the current year include shipments too late for last week's summary.

Business generally continues unchanged, and the speculative markets have had no important variations.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending February 20, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts.....	$950,207,700	$994,438,800
Deposits	963,219,300	1,028,025,600
Circulation	43,191,800	40,551,600
Specie	180,772,000	213,606,700
Legal tenders	69,074,500	70,906,300
Total reserve	$249,846,500	$284,513,000
Legal requirements	240,804,825	257,006,400
Balance surplus	$9,041,675	$27,506,600

Changes for the week, this year, were increases of $1,668,100 in deposits, $7,959,200 in specie, and $7,127,375 in surplus reserve; decrease of $5,131,100 in loans and discounts, $185,500 in circulation, and $414,800 in legal tenders.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'd—	$180,772,000	.....	$213,606,700	.....
England—	177,254,985	.....	173,066,470	.....
France—	505,304,445	$219,598,035	469,233,705	$221,631,280
Germany—	179,265,000	62,985,000	173,720,000	61,035,000
Spain—	72,135,000	99,400,000	72,930,000	98,725,000
Netherlands—	23,489,500	27,831,000	27,112,500	32,805,000
Belgium—	15,880,000	7,940,000	15,723,335	7,861,665
Italy—	86,545,000	10,892,000	110,020,000	18,646,000
Russia—	384,975,000	37,715,000	456,760,000	39,695,000
Austria—	271,440,000	63,775,000	235,075,000	61,925,000

The returns of the Associated Banks of New York are of date of February 20, and the others February 18, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The market for silver the past week has been rather top-heavy. While there has been no special pressure to sell, buyers have not been keen, and the price has settled to lower figures and closes weak at to-day's quotations.

The United States Assay Officer in New York reports receipts of 46,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to February 11 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£986,800	£1,854,939	I. £868,139
China	91,500	4,500	D. 87,000
Straits	58,508	38,103	D. 20,405
Total.....	£1,136,808	£1,897,542	I. £760,734

Receipts for the week were £200,000 in bar silver from New York, and £5,000 from Australia; also £70,000 in Mexican dollars from the Straits; total, £275,000. Shipments were £98,500 in bar silver, and £60,200 in Mexican dollars to Bombay, £2,500 in bar silver and £4,500 in Mexican dollars to Hong Kong; total, £165,700.

Indian exchange continues very strong, and all the Council bills offered in London were taken at an average of 16.16d. per rupee. It is reported that part of the demand for bills is due to large purchases of grain and rice in India for both parties in the war.

Prices of Foreign Coins

	Bid.	Asked
Mexican dollars.....	$0.46	$0.48½
Peruvian soles and Chinese pesos.....	.42	.45
Victoria sovereigns.....	4.85⅛	4.87
Twenty francs.....	3.85	3.87
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

February.	Silver—New York, Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Copper—Tin, Cts. per lb.	Spelter—Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
18	59¼	27 7/16	12¼ @12½	12 @12¼	56¾	28	4.35 @4 40	4.95	4.75
19	59	27 7/16	12¼ @12½	12 @12¼	56⅛	28	4.35 @4.40	4.95	4.75
20	59	27¼	12¼ @12½	12 @12¼	....	28⅛	4.35 @4.40	4.95	4.75
22	....	27¼	.....	.....	56¾	....	.....	.....	.....
23	59	27¼	12¼ @12½	12 @12¼	57¼	28	4.35 @4.40	4.95 @5.00	4.75 @4.80
24	58¼	26 15/16	12¼ @12½	12 @12¼	57⅛	27¾	4.35 @4 40	4.95 @5.00	4.75 @4.80

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

February 18.....	4.85¾	February 22.....	.....
" 19.....	4.85⅞	" 23.....	4.8610
" 20.....	4.86	" 24.....	4.86⅛

Copper.—Has ruled quiet but steady throughout the week. The political troubles and consequent disturbed condition of the financial markets have had a depressing influence, and business has been more or less restricted. The closing quotations are given as 12¼@12½c. for Lake copper; 12@12¼c. for electrolytic in ingots, cakes and wirebars; 11¾@12c. in cathodes; 11¾@12c. for casting copper.

The strike at the Lake mines, about which we reported last week, continues unabated.

The market for standard copper, which closed last week at £56 10s., opened on Monday at £56 15s., and the closing quotations on Wednesday are cabled as £57 10s.@£57 11s. 3d. for spot, £56 2s. 6d.@£56 5s. for three months, spot material being rather scarce.

Refined and manufactured sorts we quote: English tough, £61@£61 10s.; best selected, £62 @£62 10s.; strong sheets, £71@£71 10s.; India sheets, £68@£68 10s.; yellow metal, 6¼@6⅝d.

Exports of copper from New York during the week ending February 23 were 1,802 tons, principally to Great Britain.

Imports of copper in all forms into Great Britain for the month of January, with exports of fine copper, were as follows, the imports being reduced to fine copper in the totals; the figures are in long tons:

	1903.	1904.	Changes.
Copper ore.....	12,024	8,206	D. 3,818
Matte and precipitate.....	5,543	4,056	D. 1,487
Fine copper	3,956	8,121	I. 4,165
Totals, fine copper.....	7,930	10,970	I. 3,040
Exports	4,702	4,130	D. 572
Balance	3,228	6,840	I. 3,612

Of the imports this year, 3 tons of ore, 761 tons of matte and 4,152 tons of fine copper were from the United States, these quantities comparing with 20 tons of ore, 425 tons of matte and 801 tons of fine copper in January, 1903.

Imports and exports of copper in Germany for the full year are reported as follows, in metric tons:

	1902.	1903.	Changes.
Imports	76,050	83,261	I. 7,211
Exports	4,678	4,333	D. 345
Balance, exports	71,372	78,928	I. 7,556

Imports of copper ore in 1903 were 13,714 tons, against 14,630 tons in 1902. The exports slightly exceeded the imports, being 15,986 tons of ore in 1903, against 17,031 tons in 1902.

Tin has been quiet but steady throughout the week. Spot metal is rather scarce and commands a premium. The closing quotations are given as 28¼c. for spot, 27¾c. for futures.

The foreign market, which closed last week at £126 10s., opened on Monday at £125 12s. 6d., advanced on Tuesday to £125 15s., and the closing quotations on Wednesday are cabled as £125@£125 2s. 6d. for spot and futures.

Imports of tin into Great Britain in January, with re-exports of foreign tin, are reported as follows, in long tons:

	1903.	1904.	Changes.
Straits	2,148	1,400	D. 748
Australia	437	330	D. 107
Other countries	155	468	I. 313
Total imports	2,740	2,198	D. 542
Re-exports	2,308	1,482	D. 826
Net imports	432	716	I. 284

The falling off of this ore was almost entirely in Straits tin. The increase reported from other countries was chiefly Bolivian tin.

Imports of tin in Germany for the year 1903 were 13,925 metric tons, which compares with 13,760 tons in the preceding year.

Lead continues firm without any special feature. The closing quotations are given as 4.35 @4.40, New York, 4.30@4.32½, St. Louis.

The foreign market is firm, Spanish lead being quoted at £11 16s. 3d.; English lead, £11 18s. 9d.

Imports of lead into Great Britain in January are reported as follows, in long tons:

	1903.	1904.	Changes.
United States	3,050	2,989	D. 61
Spain	7,301	5,816	D. 1,485
Australia	5,853	7,322	I. 1,469
Other countries	1,499	1,936	I. 437
Total imports	17,703	18,063	I. 360
Exports	2,036	2,848	I. 812
Balance	15,667	15,215	D. 452

The lead credited to the United States is chiefly Mexican lead refined here in bond.

Imports and exports of lead in Germany for the full year are reported as follows, in metric tons:

	1902.	1903.	Changes.
Imports	39,046	52,440	I. 13,394
Exports	23,100	30,243	I. 7,143
Balance, imports	15,946	22,197	I. 6,251

Imports of lead ore for the year 1903 were 67,573 tons, showing a decrease of 3,505 tons, as compared with 1902.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 6, that the price of silver during the week has been 14 reales per oz. Exchange has gone up, and is now 34.57 pesetas to £1. Local quotation for pig lead has been 64 reales per quintal, which, on current exchange, is equal to £10 7s. 4d. per long ton, f. o. b. Cartagena. Exports for the week were 300,000 kg. to Liverpool and 400,000 kg. desilverized to Marseilles; also 629 kg. silver ingots to Marseilles.

Spelter.—During the week under review the market has again developed considerable strength, owing to a continued good demand on the part of consumers. The closing quotations are given as 4.75@4.80, St. Louis, 4.95@5c., New York.

The foreign market remains strong, good ordinaries being quoted at £21 15s., specials at £22.

Imports of spelter into Great Britain in January were 6,859 tons, a decrease of 41 tons from January, 1903. Imports of zinc sheets and other manufactures were 1,609 tons, a decrease of 158 tons from last year.

Exports and imports of spelter in Germany for the year were as follows, in metric tons:

	1902.	1903.	Changes.
Exports	67,680	63,213	D. 4,467
Imports	24,633	23,682	D. 951
Balance, exports	43,047	39,531	D. 3,516

Imports of zinc ores in 1903 were 67,156 tons, against 61,407 tons in 1902.

Antimony is quiet and unchanged at last week's prices: 7¾@8c. for Cookson's; 6¾@7c. for Hallett's; 6¾@6¾c. for U. S., Japanese, Italian, French, Hungarian and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price is firm at $18.50 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Imports of quicksilver into Great Britain in January were 17,210 lb., against 51,168 lb. in January, 1903. Re-exports of foreign quicksilver were 244,045 lb., against 64,380 lb. last year.

Imports of quicksilver into Germany for the full year, 1903, were 674 metric tons, an increase of 26 tons over 1902.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5% cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

	Per lb		Per lb
Aluminum		Ferro-Tungsten (37%)	38c.
No. 1, 99% ingots	33@37c.	Magnesium, pure (N. Y.)	60c.
No. 2, 90% ingots	31@34c.	Manganese	$2.75
Rolled Sheets	4c. up	Mangan'e Cop. (20% Mn)	32c.
Alum-bronze	20@23c.	Mangan'e Cop. (30% Mn)	38c.
Nickel-alum	33@38c.	Molybdenum (Best)	$2.00
Bismuth	$2.10	Phosphorus, foreign	45c.
Chromium, pure (N. Y.)	80c.	Phosphorus, American	70c.
Copper, red oxide	50c.	Sodium metal	50c.
Ferro-Molybde'm (50%)	$1.25	Tungsten (Best)	88c.
Ferro-Titanium (10%)	90c.		
Ferro-Titanium (20@25% N. Y.	55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market. Feb. 20.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore for the week was $38 per ton for three bins of choice ore, and the assay basis is apparently strong at $33 to $35 per ton of 60% zinc. One of the bins sold at $38, while a choice lot of ore assaying 64% zinc, brought only the equivalent of a $34 basis. In a majority of instances, however, the $35 rate was paid for 61% and 62% zinc that was light in iron and lead contents. Lead was advanced 50c. per ton, closing the week stronger at $56 per ton.

The district is at present outputting over 5,000 tons of ore per week, and for three weeks in succession the shipment has been over that amount, the three weeks aggregating 16,470 tons. The average for the eight weeks of the year was 4,805 tons per week. During the past week the purchases were a little larger than the shipments, a lack of cars preventing the loading of all the ore sold. The value of the eight weeks of this year, zinc and lead combined, has averaged $190,000 per week, against an average for the eight weeks of last year of $153,000. Could such a rate of increase be maintained throughout the year it would raise the total output value nearly $1,750,000 over last year.

Following are the sales of zinc and lead concentrates from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Values.
Joplin	2,813,690	353,180	$60,534
Webb City-Carterville	2,156,610	321,610	44,510
Alba-Neck	906,960	.....	16,325
Galena-Empire	699,640	175,970	16,150
Duenweg	685,620	54,960	13,865
Aurora	723,730	12,770	12,645
Badger	457,290	.....	8,000
Carthage	323,760	.....	5,825
Oronogo	314,060	13,880	5,790
Granby	390,000	26,000	5,380
Prosperity	203,230	.....	3,660
Zincite	162,780	6,020	3,090
Cave Springs	168,610	4,650	2,995
Spurgeon	49,410	77,470	2,390
Carl Junction	88,320	.....	1,630
Central City	70,850	12,630	1,415
Mitchell	66,160	.....	1,250
Peoria, I. T.	.....	15,700	440
Totals	10,280,720	1,074,840	$205,895
Eight weeks	76,887,640	9,631,770	$1,523,035

Zinc value, the week, $176,345; eight weeks, $1,259,810
Lead value, the week, 29,550; eight weeks, 263,225

The larger demand for Joplin ore at this season is attributed to the light purchases of the winter, and the probability that supplies from Wisconsin and the western States are reduced by the severe cold. To meet the larger demand for ore about a dozen of the largest outputting mines are milling ore on double shifts, and this is keeping the reserve stock very nearly stationary at about 4,500 tons.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb..	29.43	....	4.075	.....	5.043	....
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	28.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.538	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	.....	12.901	.....	57.34	.....
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June .	13.842	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12.084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan. .	25.62	55.56	21.98	45.57	26 423	57.055
Feb. .	25.41	55.09	22.11	47.89	.....	.....
Mar. .	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June .	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53 45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Ala. Con. C. & I., pf.	Mar. 1	1.75	$43,117	$732,797
†Calumet & Ariz.	Mar. 19	1.50	300,000	700,000
*Calumet & Hecla.	Mar. 22	10.00	1,000,000	84,350,000
*Central Lead, Mo.	Mar. 15	.50	5,000	395,000
C. K. & N., Colo.	Feb. 20	.01	14,319	100,233
†General Chem., pf.	Apr. 1	1.50	150,000	2,875,178
Ophir, Nev.	Feb. 24	.25	25,200	1,646,200
‡Phila. Nat. Gas, pf.	Mar. 1	1.25	99,959	1,109,026
†Standard Oil	Mar. 15	16.00	15,520,000	222,235,000
Twenty Eight Oil, Cal.	Mar. 1	.05	3,000	9,000

* Monthly. † Quarterly. ‡ Semi-annually.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Best & Belcher, Nev.	Mar. 18	Apr. 8	.10
Century, Cal.	Mar. 14	.....	.06
Dreisam, Cal.	Mar. 4	.....	.10
La Palma, Mex.	Mar. 16	.....	.06
Mexican, Nev.	Mar. 14	Apr. 5	.15
Occidental, Nev.	Mar. 10	Mar. 31	.05
Potosi, Nev.	Mar. 16	Apr. 7	.10
Red Slide, Cal.	Mar. 5	.....	.05
Rodesino, Cal.	Mar. 3	.....	.03
Savage, Nev.	Mar. 11	.....	.10
Scorpion, Nev.	Mar. 17	.....	.05
Seg. Belcher & Mides, Nev.	Mar. 10	.....	.05
Sheep Ranch, Cal.	Mar. 14	.....	.40
Sierra Nevada, Nev.	Mar. 15	Apr. 4	.10
Zubiate, S. D.	Mar. 12	.....	.20

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Feb. 17 H.	Feb. 17 L.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Feb. 20 H.	Feb. 20 L.	*Feb. 22 H.	*Feb. 22 L.	Feb. 23 H.	Feb. 23 L.	Sales.
Acacia	$1													
Amalgamated, c..	100	49½	48	48¼	47½	47¾	48⅛	48⅛	45¾			47	44⅞	38,422
Anaconda, c.	25					64	62½	62	61			62		1,415
Anaconda, g.	5													
Andes, s.	1							43				45		700
Belcher, s.	3			34										100
Best & Belcher, s..	3	2.60						2.10				2.00		400
Brunswick, g	5							06				06		1,700
Bullion, s.	1					10								100
Caledonia, s.	1							1.10	1.05					300
Challar, s., g.	2½	21	20									20		600
Confidence	3													
Con. Cal. & Va., g.s.	2½	1.90				1.70		1.60				1.65		500
Con. Imperial, s..	1							04						1,000
Creede & C. Ck., g.	1													
Cripple Creek, g..	1					09								1,000
Crown Point	2½					28						25		400
Daly, g. s	20													
Elkton, g.	1	59	58	59	58			65				64		1,000
El Paso, g.	1													
Gold Dollar, g.	1													
Gould & Curry	1													
Greene Con., c.	10	10½	9⅞	10¾	10⅜	10½	10⅜	10⅜				10¼	10⅛	7,005
Hale & Norcross	3					90								200
Homestake, g.	100					51								50
Horn Silver	20													
Isabella, g.	1			18										500
Jack Pot, g.	1											09		1,000
Julia, s.	1													
Justice, s.	2					08	07					08		500
Leadville, s. l	10													
Little Chief, g. s..	50													
Mexican, s.	3	2.60	2.00	2.10								1.80		450
Mollie Gibson, g..	5													
Moon Anchor, q..	5	10												500
Occidental, s.	3													
Ontario, s. l	100					4.75								30
Ophir, s.	3			5.10		5.00						4.50		400
Overman, s.	2			35	33									500
Pharmacist, g.	1	04												500
Phœnix, g.	1	11				11		10				11	10	1,900
Portland, g.	1			1.75		1.81		1.85				1.90		900
Potosi, s.	1			18		17								500
Quicksilver, Pf.	100													
Savage, s.	3	48	45	45		56	55					54	53	1,200
Sierra Nevada, s..	3											52		200
Silver Hill, g. s.	1							73	72			73		400
StandardCon., g.s.	10	2.25				2.25								200
Tennessee, c.	25													
Union Con., g. s.	1													
Union Copper	10													
United, com., c.	100													
Utah, s.	1													
White Knob, c.	10	8½	7¾	08	7½	7½		7⅛	6¾			7	5¾	4,430
Work, g.	1													
Yellow Jacket, s.	3													

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 169,402 shares. † Ex-dividend. *Holiday.

BOSTON, MASS.

Company.	Par val	Feb. 17 H.	Feb. 17 L.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Feb. 20 H.	Feb. 20 L.	*Feb. 22 H.	*Feb. 22 L.	Feb. 23 H.	Feb. 23 L.	Sales.
AdventureCon., c	$25	2¼	1¼	2		2		2				2		918
Aetna	5													
Allouez, c.	25	4	3¼	3⅞	3½	3¾	3⅝	3¾	3⅝			3¾	3½	3,515
Amalgamated, c.	100	49⅜	48	48¼	47⅝	47⅝	46⅞	46⅜	45¾			46⅞	45	14,170
Am. Gold Dredg.	5													
Am. Z., L. & Sm.	25											9		50
Anaconda, c. s.	25											15⅜		130
Arcadian, c.	25			40		40		40				40		750
Arnold, c.	25													
Atlantic, c.	25			7		7½	7	7				7		115
Bingham Con.	50	20		20	19¾	20⅝	19½	20⅛	20			20	19¼	755
Bonanza Dev. g.	10													
British Col., c.	5													
Calumet & Hecla	25	449	445	445				439				449		27
Centennial, c.	25	18	17⅜	17¾		17½						17⅛	17	183
Central Oil	25	7										7		130
Con. Mercur, g.	5	57½		60	50	60						56	55	1,705
Copper Range	100	40⅞	40½	40½	40	40½	39½	39⅝	39¼			39⅜	38	3,675
Daly West, g. s. l	20	35	34	35½	34	35	34½	35	34½			34½	34	1,622
†Dominion Coal	100	59½	59	59½	58¾	59⅝	59⅜	59½				58½		640
Preferred	100													
Dominion I. & S.	100	8½		8¾	8½							8¾		200
Elm River, c.	12	2⅛		2⅛								2		705
Franklin, c.	25	9	8¾	8⅞	8½			8⅜						153
Granby Con.	10	3½				3⅜								550
Guanajuato Con.	5			74										100
Isle Royal Con.	25			7½	7¼	7¼		7⅛	7			7		545
Mass Con., c.	25	4	3¾	3⅜	3½			3½				3 1/16	3½	685
Mayflower, c.	25													
Michigan, c.	25			5½	5	5		5	4⅞			5	4½	485
Mohawk, c.	25	35		35⅛		35		35				35½	34½	820
Mont. Coal & C.	25													
Mont'l & Boston.	5	60		50										500
New Idria, q.	5													
Nova Scotia St.	100													
Preferred	100													
Old Colony, c.	25					87½		1				1		50
Old Dominion, c.	25	11¼	9½											595
Osceola, c.	25	58				57	55⅜	56	55			56	23½	666
Parrot, s. c.	10	25	24⅜	25	24½	24½	23½	23½						809
Phœnix Con, c.	25	2¼		2¼	2									100
Quincy, c.	25	85						85	83			81	80	54
Rhode Island, c.	25					1		1⅛						30
Santa Fe, g. c.	10	2												100
Shannon, c.	10	8		8		8		8⅛	8					1,185
Tamarack, c.	25					102	100					100		16
Tecumseh, c.	25													
Tennessee, c.	25													
Trinity, c.	25	4¾		4¾		4¾		4⅞				4¾	4⅝	2,073
United c.	100													
United States, g.	10	20⅛	20½	20½	20⅜	20⅜	20¼	20⅜	20⅛			20¼	20	1,918
U. S. Coal & Oil.	25	9¼	8¾	9⅛	9	9¼		9⅛	9			9	8⅞	1,050
Utah Con., g. c.	5	33⅜	32⅞	33⅝	33	33⅜	32¾	33	32½			33	31½	2,300
Victoria, c.	25	3½		3½	3⅜									390
Winona, c.	25	5½		5⅝	5¼	5¼	05	5½				5		400
Wolverine, c.	25					71		71				70		160
Wyandot, c.	25	87½		87½	75	75						75		625

*Holiday. †Ex-dividend. ‡Assessment Paid. Total sales, 44,604 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts.	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth	10	50.00	61.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Dev.	10	3.00		Wolv. & Arizona	10	4.60	
Junction Dev.	10	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Feb. 17 H.	Feb. 17 L.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Feb. 20 H.	Feb. 20 L.	†Feb. 22 H.	†Feb. 22 L.	Feb. 23 H.	Feb. 23 L.	Sales
Allis-Chalmers	$100	13½	13									12⅞	12½	600
Preferred	100			60¼								59¾		110
Am. Agr. Chem	100													
Preferred	100													
Am. Sm. & Ref.	100	48¼				47½		47½				47¾	47	1,822
Preferred	100	91		91		91						90¾	90	1,388
Col. Fuel & I.	100	31½		30¾								31	30⅜	1,090
Preferred	10													400
Col. & H. C. & I.	100	13¼	12¾	13½	12¾	13¾	13½					12¾		900
‡Crucible Steel	100			3¾										100
*Preferred	100	27⅞		27½		27½		27½	27			27½	27⅛	440
General Chem.	100	50		49		49⅛	49							500
Preferred	100											94		100
*Mong. R. Coal	50													
*Preferred	100					25	24⅜							35
National Lead	100	15⅝										14⅝	14½	300
Preferred	100											84½		100
*Phila. Nat. Gas	100													
*Preferred	100													
*Pittsburg Coal	100	13⅜		13⅛		13⅛	12¾	13½				13¼		760
*Preferred	100	48¾	48	48½	48	48⅜		49	48¾			49	48½	1,102
Republic I. & S.	100	7¾		7¾		7⅞	7½	7⅜				7½	7⅜	900
Preferred	100			44½		44	43½							500
Sloss-Shef S. & I.	100	38¾	38	38½	38¼	38		38				37	36⅝	1,270
Preferred	100											80¼		100
‡Standard Oil	100			636	634	‡623						610		17
Tenn. C. I. & R.R.	100	37	36½	37¼	36¼	36	35½	35½	35¼			35¾	34½	3,850
U.S. Red. & Ref.	100													
Preferred	100													
U.S. Steel Corp.	100	11¼	11	11⅛	11	11⅛	10⅞	10⅞	10¾			11	10⅝	18,300
Preferred	100	57⅛	56⅝	57¼	56½	56¾	56¼	56¾	56			56½	55½	64,720
Va.-Car Chem.	100			29								28	27½	1,032
Preferred	100													

*Pittsburg exchanges. †Holiday. ‡Ex. dividend. Total sales, 100,206.

COLORADO SPRINGS, COLO.

Company.	Par Val	Feb. 13 H.	Feb. 13 L.	Feb. 15 H.	Feb. 15 L.	Feb. 16 H.	Feb. 16 L.	Feb. 17 H.	Feb. 17 L.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Sales
Acacia	$1	.07¼	.06¾	.07⅛	.07	.07⅛	.07	.07¼	.06¾	.07⅛	.06¾	.07⅛	.07	6,000
American Con.	1													
Anaconda	5	.16¼	.12½	.16⅛	.12½	.16½	.12⅝	.16	.12½	.16	.12½	.16	.14½	2,000
Colo. City & M.	1	.03¼	.03⅛	.03¼	.03⅛	.03¼	.03	.03¼	.03	.03¼	.03	.03¼	.03	1,000
C. K. & N.	1	.18⅛	.17½	.20	.17½	.19⅝	.17	.18½	.17⅛	.18½	.18	.19¼	.19	8,000
Cripple Ck. Con.	1	.08⅜	.08⅛	.08⅝	.08¼	.08½	.08	.08⅜	.08⅛	.08⅜	.08½	.08¼	.08⅛	46,000
Des Moines	1			.02⅜	.02⅜	.02½		.02½	.02¼	.02⅜	.02⅛	.02		7,000
Doctor Jack Pot.	1	.10	.09¼	.10	.09	.10	.09½	.10	.09	.10	.09	.10	.09	1,000
Elkton Con.	1	.61	.59½	.60¼	.59½	.60½	.60	.60¼	.60	.60½	.60¼	.61½	.61	10,195
El Paso	1	.68	.65¼	.66	.65½	.67	.66	.67¼	.67	.67¼	.67⅛	.67	.66⅝	13,588
Gold Dollar Con.	1	.05⅜	.05	.05¼	.05½	.05¼	.05	.05¼	.05	.05¼	.05⅛	.05¼	.05⅛	17,000
Gold Sovereign.	1	.04⅛	.04⅛	.04⅜	.04¼	.04¾	.04¼	.04¼	.04⅛	.04¼	.04	.04¼	.04	13,000
Golden Cycle	1	.54½	.53½	.54	.53	.53½	.53	.53½	.51½	.53	.51½	.51½	.51	6,600
Golden Fleece	1	.04		.04		.04		.04		.04		.04		
Hart	1	.03¼	.02	.03	.02¼	.03	.02	.02¾	.02½	.02¾	.02½	.03	.02½	
Isabella new	1	.19	.17	.18⅜	.18½	.18¼	.18	.18	.17½	.17	.14	.37	.35½	11,000
Jack Pot	1	.07½		.08⅛	.07½	.09	.07½	.09	.06½	.08¼	.07½	.09	.06	
Keystone	1	.04½	.04	.04¼	.04⅜	.04½	.04	.04	.03¾	.04¼	.03⅜	.04	.03¾	4,000
Last Dollar	1	.45		.45		.45		.45		.45		.45		
Lexington	1	.04⅜	.04½	.04⅜	.04½	.04¾	.04½	.04¾	.04½	.04¾	.04⅝	.04⅜	.04⅝	5,000
Little Puck	1	.03⅞	.03⅝	.04½	.04⅜	.04⅝	.04⅝	.04½	.04	.04⅝	.04⅛	.04¼	.04	65,500
Mollie Gibson	1	.05		.05		.05		.05		.05		.05		
Moon-Anchor	5	.11	.09½	.10¼	.09	.12	.09½	.10½	.09¾	.10¼	.09¾	.11	.10	2,000
New Haven	5	.02¾	.02¾	.02¾	.02½	.02¾	.02½	.02½	.02⅝	.02⅝	.02⅝	.02⅞	.02¾	11,000
Old Gold	1	.09¼	.09	.09½	.09¼	.10	.09⅜	.10½	.09⅞	.10½	.09¾	.10¼	.10	3,000
Pharmacist	1	.04½	.04	.04¼	.04¼	.04½	.04⅛	.04½	.04	.04¼	.04	.04¼	.04	4,000
Pinnacle	1	.04	.03½	.04	.03¼	.04	.03⅛	.04	.03½	.04	.03¾	.04		2,000
Portland	1	1.95	1.92	2.00	1.75	2.00	1.70	1.95	1.80	1.95	1.80	1.95	1.85	600
Vindicator Con.	1	.70	.63	.62		.65½	.64½	.65	.63½	.65	.63	.65	.64	4,000
Work	1	.07	.06⅝	.06¾	.06½	.07	.06½	.06¾	.06½	.06¾	.06½	.06⅝	.06⅝	6,000
	1													

Total sales, 249,493 shares.

COLORADO SPRINGS (By Telegraph).

Company.	*Feb. 22. H.	*Feb. 22. L.	Feb. 23. H.	Feb. 23. L.	Company.	*Feb. 22. H.	*Feb. 22. L.	Feb. 23. H.	Feb. 23. L.
Anaconda			.16	.15	Jack Pot			.09	.07¾
Cripple Ck Con.			.08	.07⅝	Last Dollar			45	.40
C. K. & N.			.18½	.18½	Mollie Gibson			.09	.05
Doctor-Jack Pot.			.10	.08	Moon Anchor			.11	.10
Elkton Con			.61½	.61	Old Gold			.10¼	.10
El Paso			.68	.67	Pharmacist			.04¼	.04
Gold Dollar Con.			.05¼	.05⅛	Portland			1.95	1.80
Gold Sovereign			.04⅛	.03⅞	Vindicator			.68½	.65
Isabella			.36½	.33	Work			.06¾	.06¼

SAN FRANCISCO.

Company.	Location.	Feb. 11 H.	Feb. 11 L.	Feb. 12 H.	Feb. 12 L.	Feb. 13 H.	Feb. 13 L.	Feb. 15 H.	Feb. 15 L.	Feb. 16 H.	Feb. 16 L.	Feb. 17 H.	Feb. 17 L.	Sales
Central Eureka	Cal													
Golconda	Ore.													
Hannapah	Nev.													
Lightner Mg. Co.	Nev.											3.25		500
MacNamara	Nev.			.21		.21	.19	.20	.17	.18		.19	.18	7,500
Mont. Tonopah	Nev.	1.42½	1.37½	1.40		1.37½		1.40		1.37½		1.40		2,900
Penna. C. M. Co.	Cal											7.00		402
South Eureka	Cal													
Ton. Belmont	Nev.	.64		.60		.60		.63	.60	.63	.59	.61	.60	3,306
Ton. Midway	Cal	.45	.44			.44	.42	.42	.41	.41		.41	.40	8,506
Ton. Mg. Co.	Nev.			6.12½								6.12½		200
Ton. North Star	Nev.			.35		.34		.35	.34			.30		3,100
Ton. & Salt Lake	Nev.													
Ton. Superior	Nev.													

San Francisco and Tonopah Mining Exchange.
Total sales, 26,414 shares.

SAN FRANCISCO (By Telegraph).

Company.	February *22.	February 23.	Name of Company.	February *22.	February 23.
Belcher		24	Gould & Curry		.42
Best & Belcher		.20	Hale & Norcross		.97
Caledonia		1.00	Mexican		1.75
Challenge Con.		.35	Ophir		4.50
Chollar		.20	Overman		.33
Confidence		1.10	Sierra Nevada		.53
Con. California & Virginia		1.65	Union Con.		.82
Crown Point		.22	Yellow Jacket		.48

STOCK QUOTATIONS

MEXICO.* Feb. 12

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles..	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos....	2,400	49	55
Cinco Senores y An., aviadoras	2,000	60	65
Cinco Senores y An., aviada	400	60	65
Providencia, San Juan de la Luz	6,000	60	65
Queensland y Australia	300	72	85
Guerrero:			
Delfina, 1st serie.....	2,500	52	55
Delfina, 2nd serie....	2,500	35	45
Garduno y Anexas...	7,200	35	45
Hidalgo:			
Amistad y Condordia	9,000	81	82
Carmen, aviada.....	1,100	80	100
Guadalupe Fresnillo Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora.	1,536	.....	.....
La Blanca, aviada....	768	.....	.....
La Reina y An., aviadora	5,600	14	16
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo ..	1,000	130	180
Palma y An., aviador	1,800	14	20
Real del Monte.....	2,554	.....	.....
Refugio, aviada.....	12,800	5	7
Santa Anay An., aviadora	1,800	85	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	82½	84
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	17	19
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,670	1,700
San Rafael y An., aviada.	1,200	680	700
Soledad, aviada.....	900	680	700
Sorpresa, aviada. ...	900	295	305
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran.....	2,400	20	.25
Aldebarren.....	2,000	40	50
Buen Despacho.....	3,000	30	35
Dos Estrellas.....	3,000	1,750	1,800
La Esperanza (El Oro.).....	3,000	1,500	1,500
La Reformia, aviadores.....	2,000	24	28
Providencia, pagadoras.....	1,600	.....	.....
Providencia, liberadas.....	900	.....	.....
Santa Ana, Esperanza.....	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora.....	3,000	80	95
Luz de Borda, aviado.....	1,000	30	40
Santiago y An., Tlal..	4,000	4	7
Nuevo Leon;			
La Fraternal.....	1,000	580	620
Norias de Bajan.....	1,000	880	920
San Luis Potosi:			
Concepcion y An.....	3,000	68	75
El Barreno, aviadora.	2,000	45	50
Sta. Maria de la Paz..	2,400	164	168
San Diegoy Annexas.	2,400	8	10
Zacatecas:			
Asturiana y An.....	2,500	40	55
Candelaria y Pinos..	2,500	130	140
Cubiertas.....	2,400	.....	.....
Esperanza y An.....	2,400	6	8
Lourdes.....	2,500	22	27
Luz de Minillas, pagadoras.....	2,000	15	30
Nueva Quebradilla, aviadoras.....	2,400	90	100
Nueva Quebradilla, aviadas.....	600	70	80
San Carlos y Annexas	2,500	60	80
Sta. Maria de Gaud..	2,500	64	70
Miscellaneous:			
Bartolome de Medina	2,000	78	80
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.).....	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)..	100	11,000	13,000
Natividad (Oaxaca) aviadora.....	1,800	950	100
Natividad (Oaxaca) aviadas.....	600	.....	.....
San Francisco Hac...	6,000	64	70
Santa Ana Huantla Morelos.....	4,000	.....	.....
Union Hacienda.....	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. Feb. 2

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g.....	$1	.04	.02	.....
Cariboo-McKin	1	.06	.03	.....
Cariboo-Hydr.....	1	.70	.....	.....
Center Star, g. s....	1	.24	.22	2,000
Crows Nest, C.C....	100	2.60	2.00	.....
Dominion Coal	100	.61	.58	30
Dominion S. & I. ..	100	.09¼	.08	.....
Fairview, g. s.... ..	1	.03½	.02½	.....
Giant, g. s.....	1	.02½	.01	.....
Deer Trail, g. s....	1	.03	.01	.....
Iron Mask, g. s.....	1	.06	.....	.....
Morrison, g. s.....	1	.04	.01	.....
.....	.....	.....	.....	.....

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter...	$10	4.25	3.75	.....
Mountain Lion, g.	1	.18	.12	.....
North Star, g. s...	1	.08	.07	.....
Nova Scotia Steel..	100	.....	.....	.....
Payne, s. l.....	1	.16	.10	.....
Rambler Carib	1	.35	.25	.....
Republic, g.....	1	.03	.02	.....
St. Eugene, g. s...	1	.40	.30	.....
Virtue, g. s.....	1	.07	.06	.....
War Eagle Con....	1	.14	.09	.....
Sullivan, g. s.....	1	.06	.03	.....
Winnipeg, g. s....	1	.04	.....	.....
Wonderful, g. s..	1	.04	.03	.....

g—Gold. l—Lead. s—Silver. Total sales, 30.

SALT LAKE CITY.* Feb. 20

Company	Par Val	High	Low	Sales.
Ajax	10	.05½	.03	11,500
Butler Liberal.	1	.10	.09½	1,550
Century.....	1	.80	.75	1,900
Con. Mercur....	1	4.22½	3.82	1,500
Daly-Judge	1	35.00	34.50	345
Daly West.....	20	.57½	.55	2,200
Egl. & Blue Bell	1	.50¼	.50	200
Ingot.....	½	.01¾	.01⅞	3,000
La Reine.....	1	.02¼	.02¼	500
Little Chief	1	.41	.40	1,157
L. Mammoth..	1	.01½	.01½	2,000
May Day.....	¼	.06¼	.05¾	10,200

Name of Company	Par Val	High	Low	Sales.
M. Washington	⅛	.00⅛	.00⅛	19,500
N. Y. Bonanza.	....	.13	.11	13,000
Naildriver	....	.50	.50	250
Sacramento....	5	.21½	.21	5,900
Silver Shield*..	....	.01	.01	3,000
Star Con.....	1	.20½	.16	3,303
Tetro.....	1	.35	.32	6,800
Utah	....	.53½	53	200
Uncle Sam Con.	1	.23	.21½	3,100
Victor Con.....	....	.03½	.03½	1,000
Wabash	1	.03½	.03½	500
Yankee Con....	1	.45	.40	2,100

*By our Special Correspondent. All mines are in Utah. Total sales, 94,702 shares.

PHILADELPHIA, PA.

Company.	Par val.	Feb. 17 H.	Feb. 17 L.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Feb. 20 H.	Feb. 20 L.	*Feb. 22 H.	*Feb. 22 L.	Feb. 23 H.	Feb. 23 L.	Sales
Am. Cement.	$10	.....	.....	.....	.....	7⅜	.....	7⅜	.....	.....	.....	7⅛	.....	150
Cambria Iron	50	.....	.....	.....	.....	.....	.....	46½	.....	.....	.....	46½	.....	71
Cambria Steel	50	19¾	19⅜	19⅛	19¼	19¼	.....	19⅜	19⅛	.....	.....	19⅛	18⅞	1,656
Pa. Steel, pfd.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susq. I. & S..	5	.....	.....	.....	.....	½	.....	.....	.....	.....	.....	.....	.....	100
United Gas I.	50	85	84¾	84¾	84½	84¼	84	84	.....	.....	.....	83½	83	1,569
Lehigh Nav'n	50	66	65½	.....	.....	.....	.....	.....	.....	.....	.....	66½	66	226
Philadelphia .	50	39½	.....	39¼	38¾	38¾	38⅛	38⅛	38⅝	.....	.....	38⅛	38	1,584
U.S. Steel.....	100	.....	.....	11	.....	11	.....	11	10⅞	.....	.....	10¾	.....	685
U.S. Steel. pf.	100	57¼	56⅝	57⅛	56⅛	56⅝	56⅜	56⅜	56⅛	.....	.....	56¼	55⅛	6,725

*Holiday. †Ex-Dividend Total sales 12,766.

LONDON. Feb. 12

Company.	Shares Issued.	Par value. £ s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £ s. d.	Quotations. Sellers. £ s. d.
American:						
Alaska-Treadwell.....	200,000	5 0 0	1 6	Jan., 1904	4 5 0	4 7 6
Anaconda.....	1,200,000	5 0 0	2 0	Nov., 1903	3 6 3	3 8 9
*Camp Bird.....	820,000	1 0 0	9	Feb., 1904	1 3 9	1 6 3
Copiapo.....	112,500	2 0 0	6 10	May, 1903	1 2 6	1 7 6
De Lamar.....	80,000	1 0 0	2 0	Oct., 1903	10 0	12 6
El Oro.....	1,080,000	1 0 0	9	Jan., 1904	1 1 3	1 3 9
Frontino & Bolivia.....	128,662	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi.....	200,000	5 0 0	5 0	Nov., 1899	1 0 0	1 2 6
Le Roi No. 2.....	120,000	5 0 0	1 0	Feb. 1904	15 0	17 6
Montana.....	657,128	1 0 0	6	April, 1899	1 3	1 9
Standard.....	500,000	4 0	2½	Sept., 1903	3 0	4 0
Stratton Independence.	1,000,007	1 0 0	6	Dec., 1903	4 6	5 0
St. John del Rey..	546,265	1 0 0	6	Dec., 1903	14 6	15 6
Tomboy.....	300,000	1 0 0	1 0	June, 1902	1 10 0	1 15 0
Utah.....	300,000	1 0 0	6 3	Jan., 1904	6 5 0	6 10 0
Ymir.....	200,000	1 0 0	1 0	Mar., 1902	3 9	8 3
European:						
Linares.....	15,000	3 0 0	1 0	Mar., 1903	2 0 0	2 10 0
Mason & Barry	185,172	1 0 0	11 0	May, 1903	3 10 0	3 15 0
Rio Tinto.....	325,000	5 0 0	32 6	Nov., 1903	47 12 6	47 17 6
Rio Tinto, preferred....	325,000	5 0 0	2 6	Nov., 1903	5 17 6	6 2 6
Tharsis.....	625,000	2 0 0	6 0	May, 1903	4 7 6	4 12 6
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	3 0 0	3 2 6
Cosmopolitan.....	400,000	1 0 0	1 0	May, 1903	16 0	16 6
Golden Horseshoe.....	300,000	5 0 0	6 0	Nov., 1903	8 10 0	8 15 0
Great Boulder.....	1,750,000	2 0	9	Dec., 1903	1 7 0	1 7 6
Great Fingall.....	250,000	1 0 0	6 0	Jan., 1904	8 6 3	8 8 9
Ivanhoe.....	200,000	5 0 0	5 0	Jan., 1904	8 15 0	8 17 6
Kalgurli.....	120,000	1 0 0	2 6	Jan., 1904	5 15 0	5 17 6
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 5 0	1 7 6
Oroya-Brownhill.....	450,000	1 0 0	2 6	Dec., 1903	4 0 0	4 1 3
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	Feb., 1904	2 17 6	3 2 6
Briseis.....	600,000	1 0 0	.....	.....	5 0	6 0
Broken Hill.....	960,000	8 0	1 6	Feb., 1904	1 8 9	1 10 0
Mt. Lyell.....	275,000	3 0 0	4 3	Sept., 1903	15 0	16 0
*Mt. Morgan.....	1,000,000	1 0 0	3	Feb , 1904	1 17 6	2 2 6
Waihi.....	497,412	1 0 0	2 6	Mar., 1904	4 18 9	5 1 3
Indian:						
Champion Reef.....	513,832	10 0	6 6	Jan., 1904	6 7 6	6 10 0
Mysore.....	506,043	10 0	4 4	Jan., 1904	5 12 6	5 15 0
Nundydroog.....	484,000	10 0	1 6	Nov., 1903	1 18 9	2 1 3
Ooregum	343,000	10 0	9	Dec., 1903	1 0 0	1 2 6
Ooregum, pfd.....	240,000	10 0	1 9	Dec., 1903	1 5 0	1 10 0
South African:						
Angelo.....	600,000	1 0 0	4 0	Jan., 1904	6 0 0	6 5 0
*Bonanza.....	200,000	1 0 0	10 0	Feb., 1904	1 15 0	1 17 6
British South Africa....	4,436,019	1 0 0	rts.	May, 1889	1 17 6	1 18
Cape Copper.....	300,000	2 0 0	4 0	Jan., 1904	2 12 6	2 17 6
Cape Copper, pfd.....	75,000	2 0 0	1 9	Jan., 1904	2 15 0	3 0 0
City & Suburban.....	340,000	4 0 0	8 0	Feb., 1904	6 10 0	6 12 6
Consol. Gold-Fields.....	2,000,000	1 0 0	.....	.....	6 1 3	6 2 6
Crown Reef.....	120,000	1 0 0	20 0	Oct., 1903	15 15 0	16 5 0
De Beers, preferred....	800,000	2 10 0	10 0	Jan., 1904	19 1 3	19 3 9
De Beers, deferred.....	1,000,000	2 10 0	15 0	Jan., 1904	19 13 9	19 16 3
East Rand.....	980,000	1 0 0	5 0	Aug., 1903	6 2 6	6 5 0
*Ferreira.....	90,000	1 0 0	22 6	Feb., 1904	18 10 0	19 0 0
*Geldenhuis..... ...	200,000	1 0 0	6 0	Feb., 1904	5 0 0	5 5 0
Geduld.....	400,000	1 0 0	rts.	Mar., 1902	5 12 6	5 15 0
*Henry Nourse.....	125,000	1 0 0	10 0	Feb., 1904	7 17 6	8 2 6
Jubilee.....	50,000	1 0 0	5 0	Feb., 1904	4 0 0	4 5 0
Jumpers.....	100,000	1 0 0	5 0	Aug., 1899	2 12 6	2 17 6
*Langlaagte.	470,000	1 0 0	2 0	Feb., 1904	3 5 0	3 7 6
May.....	288,750	1 0 0	3 6	Feb., 1904	3 16 3	3 18 9
*Meyer & Charlton.....	100,000	1 0 0	5 0	Jan., 1904	5 0 0	5 2 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	7 3 9	7 6 3
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein..	200,000	5 0 0	10 0	Dec., 1903	27 17 6	28 2 6
New Primrose.....	325,000	1 0 0	3 0	Jan., 1904	3 11 3	3 13 9
Rand.....	1,795,956	5 0	4 0	Aug., 1902	9 0 0	9 1 3
*Robinson.....	750,000	5 0 0	5 6	Feb., 1904	9 7 6	9 10 0
*Robinson Deep.....	950,000	1 0 0	3 0	Jan., 1904	4 15 0	4 17 6
*Rose Deep....	425,000	1 0 0	2 6	Feb., 1904	7 5 0	7 10 0
Salisbury	100,000	1 0 0	2 0	Mar , 1899	1 10 0	1 15 0
Sheba.....	1,075,000	1 0 0	6	July, 1899	6 3	8 9
Village..... ...	400,000	1 0 0	3 0	Feb., 1904	4 17 6	5 2 6
Wemmer	80,000	1 0 0	10 0	Jan., 1904	9 13 0	10 0 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	Feb. 17 £. s. d.	Feb. 24 £. s. d.	Company.	Feb. 17 £. s. d.	Feb. 24 £. s. d.
Anaconda.....	3 7 6	3 2 6	El Oro.....	1 2 6	1 2 0
British So. Africa.	2 2 6	1 13 9	Modderfontein....	7 10 0	7 4 4½
Camp Bird.....	1 5 3	1 3 6	Rand Mines.....	9 8 9	8 12 6
Con. Gold Fields.	6 3 9	5 8 9	Rio Tinto	18 15 0	6 15 0
De Beers.....	19 16 3	19 3 9	Simmer & Jack...	1 8 1½	1 7 6
East Rand.....	6 9 4½	6 4 4½	Tomboy.....	1 8 9	1 7 6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 11

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal.....	France	.....	.....	290.00	5,525.00	5,520.00
Boleo, c.....	Lower Cal.....	12,000,000	500	62.50	1,780.00	1,752.00
Champ d'Or, g.....	S. Africa.....	3,375,000	25	3.75	18.00	18.00
Courrieres, Coal.....	France	600,000	300	110.00	2,730.00	2,720.00
Fraser River, g.....	Brit. Col.....	250,000	25	.....	5.50	5.50
Huanchaca, s.....	Bolivia.....	40,000,000	125	2.50	73.00	73.50
Laurium, z. l....	Greece.....	16,300,000	500	25.00	325.00	328.00
Malfidano, z.....	Italy	12,500,000	500	50.00	610.00	588.00
Metaux, Cie. Fran. de.....	France	25,000,000	500	22.50	480.00	465.00
Mokta-el-Hadid, i. l.....	Algeria	18,312,000	500	40.00	836.00	839.00
Nickel, n.....	N. Caledonia..	15,000,000	250	22.50	510.00	508.00
Penarroya, Coal	Spain.....	.....	500	45.00	1,125.00	1,080.00
Vielle Montagne z.	Belgium.....	9,000,000	30	30.00	699.00	675.00
Wyoming, o.....	California.....	.....	25	.....	332.00	354.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* Feb. 20

Name.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo....	$10	$0.25	$0.50	Columbia Lead, Mo.	$10	$3.50	$4.50
Catherine Lead, Mo.	10	.90	1.50	Con. Coal, Ill.....	100	17.00	18.00
Central Coal & C....	100	58.50	59.15	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	70.00	71.00	Granite Bimet. Mt..	10	.30	.50
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.75	16.00

*By our Special Correspondent.